

THE INDEPENDENT GUIDE TO IBM PERSONAL COMPUTERS



January 8, 1985

PC
NEWS:
HARD DISK
DISASTERS

What's in the Cards for Your IBM

*Ray Bradbury, Stewart Brand
And Other Experts on the Future
Of Microcomputing*

Editors' Choice:
**PC Picks the Best
(and Worst) of 1984**

**Business
Graphics:
Presentations
With Pizzazz**



**The IBM and
The Space Shuttle**

**Screenbusters!
Getting in Touch
With Your Monitor**



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behind your PC is
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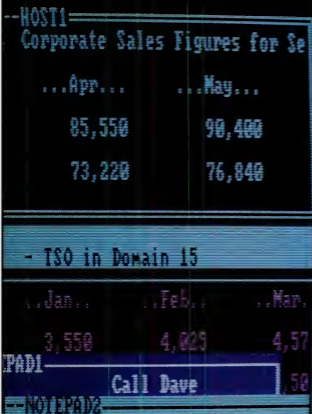


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PC

The Independent Guide to
IBM Personal Computers

VOLUME 4 NUMBER 1
JANUARY 8, 1985

COVER STORIES



Looking Ahead: Key Forces That Will Shape the World of Computing

Werner L. Frank/Fifteen dramatic changes in the world of computers will affect the way men and women work and live in the next decade and beyond. The PC is the powerful driving force behind the predicted trends.

Other Voices, Other Futures

Brad Lemley/PC canvassed 12 leaders from diverse fields across the country for their comments on Werner Frank's predictions about the future of computing. Not surprisingly, these leaders disagreed. A few said that Frank had overstated the probable impact of microcomputers, but most felt he had played it too cool.

EDITOR'S CHOICE

The Best of 1984, and Some of the Worst

Barbara Krasnoff/In honor of our first issue of 1985, PC salutes the best microcomputer-related products of 1984—and pans a few of the worst.

SPECIAL REPORT Graphics That Dress for Success

Kathryn Alesandri/Graphics help others see things the way you see them. Their impact is too powerful to be neglected.

Charting Your Course on the PC

Jack Bishop/Business presentation graphics on the PC help you analyze and illustrate numbers with a variety of charts.

PC Systems for Pie Chart Picasos

Robin Raskin and Tom Christopher/These three business presentation graphics systems can help you be your own art production house—within limits. All produce charts and graphs relatively cheaply.

Samurai Image Processor

Diane Burns and S. Venit/The Samurai system can quickly and cheaply produce high-quality 35mm slides of computer graphics.



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FEATURES

PC Graphics Challenge the Mighty Cray

John Fowler/Can graphics produced on a PC approach the quality of those made on a state-of-the-art Cray supercomputer? The answer may very well surprise and tantalize you.

APPLICATIONS Shuttle Radar and PCs Map the Earth

Cheryl J. Goldberg/Investigators for the Shuttle Imaging Radar project aboard the space shuttle Challenger used PC-XTs to plan the mission before the mission began, and "real time" when it was underway.

SOFTWARE Zooming in for a Closer Look

Dick Aarons/Index Technology's expensive new *Excelsior* package helps handle the mind-boggling details involved in the design and documentation of complex systems.

HARDWARE Screenbusters

Dan Wexler/Two new touch-screen systems offer an input alternative to users who are tired of tangling with their keyboards. But while a touch screen will save you from having to pay simultaneous attention to both your keyboard and the screen, at the same time you may end up with a tired arm.

WORD PROCESSING Eek! A Mouse for the PC

Richard Werbin/A little tinkering and the right hardware will allow you to add a mouse interface to nearly any PC word processing program. But a mouse works better with some word processors than with others.



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DESIGN
Freehand Graphics 277
 Mark Kassi/PC Paintbrush and Dr. Halo are two freehand drawing programs that offer features resembling those of the Apple Macintosh's MacPaint program.

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For Doctors: Windows in the Office 281
 Bernard Friedman, M.D./Windows make medical office billing and financial record keeping less tedious. Doctor's Office Manager has features lacking in other packages. But is it worth the price?

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A PC Helps Fight Class-Action Suits 287
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Up In Smoke 293
 Bruce Gesti/Traditional fire-fighting materials, like water and powder, can wreak havoc when poured on electronic equipment and magnetic media. Halon 1211 offers an attractive alternative.

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 Alfred Glossbrenner/If you don't have the time to look for what you want from an on-line database, let an information broker, such as Information on Demand, do the searching for you.

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PC ARCADE
Checkerboard Challenge 263
 Phil Wiswell/Gramps and Sargon III should provide you with hours of checker or chess enjoyment.

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 Bruce Filbeck/Games, Graphics and Sound for the IBM PC and Graphics Primer for the IBM PC are two primers that explain the basics that will enable you to create impressive graphics on your PC. One will teach you to write video games; the other reveals "little known" graphics tricks.

NEW ON THE MARKET 296
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 A quick reference guide for PC owners.

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USER-TO-USER 337
 Paul Somerson/PC owners share their tips and short programs.

PC TUTOR 341
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Cover Photograph: Dennis Chalkin

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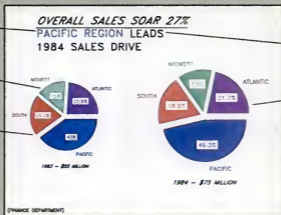
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(Millions of \$)

	'78	'79	'80	'81	'82
Sales	86.4	121.0	144.0	163.8	182.0
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ROS(%)	6.9	7.3	7.9	8.2	8.8
Mkt. Share	48%	81%	85%	71%	76%

Capital expenditure required \$5 Million
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(opportunity cost of capital = 24%)

(Source: Annual Report)

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Reference Magazine

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Digital Review

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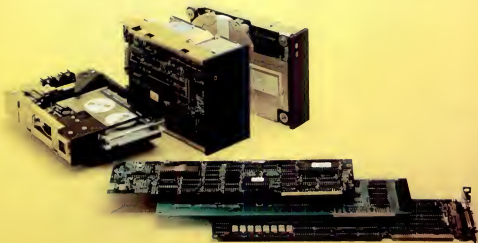
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Here's Sidekick in action. That's Lotus 1-2-3 running underneath. In the Sidekick Notepad you can see data that's been imported from the Lotus screen. On the upper right, that's the Sidekick Calculator.

BB: (C2) 400

ROUTINE			
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What's Inside

The end of the year is the traditional time for people to take stock. Hence we present a roundup of opinions on the best (and worst) products of 1984—and take an intriguing look at the next decade.

Well, it looks like we all managed to survive 1984. Big Brother hasn't taken over (not that we've noticed, anyways); the Bomb remains safe in its silo; and the only measurable effect of George Orwell's horrific vision is increased profits for the book's publishers, who collected a tidy sum from its increased sales.

With that in mind, we thought that this might be as good a time as any to try to ascertain what the future may hold for microcomputing. So we contacted computer wizard Werner L. Frank, who brushed the cobwebs off his crystal ball, booted it up, and wrote a probing article to explain the ways in which microcomputers will affect the coming decade.

Of course, we were not content to rest with one man's opinion. We asked freelance author Brad Lemley to send a copy of Frank's predictions to a group of today's movers and shakers and find out if they agreed with his rather optimistic viewpoint. A couple of weeks later, Lemley reported back to us with a multitude of very definite reactions, most of which had very little in common with each other.

Speaking Our Mind

In fact, about the only thing that everybody in this industry shares is strong opinions. PC's offices are a case in



point. It is impossible to walk more than a few feet without hearing somebody announce, "Well, I'll tell you what I think of that."

Of course, since we deal predominantly with the microcomputer industry, most of our opinions center on the various products, companies, and trends that circulate through the office. In past columns, I've mentioned how a new product can bring editors running from whatever they are doing. However, it's not until the demo is over and the company representatives are safely out of the offices—recovering from the third degree they got here—that the fun really begins.

If a product strikes us as a good one, then there is usually general agreement among all concerned, and the only real debate is over who gets to review it.

If a product seems mediocre, then the sparks begin to fly. A typical editorial session may begin with editor Bill Machrone sitting back in his chair and asking, "Well, what do you think?"

"It stinks," answers executive editor Mike Edelhart with his usual suave diplomacy.

"I don't know," technical editor Craig Stark might object mildly, "it has some nice features. It isn't every program that plays 'The Battle Hymn of the Republic' every time it prints a spreadsheet."

At this point, executive editor Paul Somerson will usually pop his head through the door and yell something like, "I tried it out last week. It's not too bad, although I could probably have done a better job with those graphics."

In the end, the software is given to a free-lance writer to review. Likely as not, the writer will find some truly neat facet of the package that even the company's representative failed to notice.

The worst products bring out the worst in the staff. Whenever a real clunker hits someone's desk, it is passed from editor to editor with the kind of mischievous glee usually found only among kids who

WHAT'S INSIDE

have just tied the cat to the dog.

For example, when a program purporting to alleviate a certain, somewhat sensitive, masculine problem was deliv-

ered to a female editor, she immediately wandered over to a male colleague's office, smiled sweetly, and dropped it unceremoniously on his desk. "Thought

you'd be the perfect person to review this," she said, and fled.

He got back at her, though. A few days later, a public-relations notice for a new children's software product called *Barbie* appeared in her mailbox with a note attached reading, "Is this product more your style?"

You can imagine that it was with no small sense of enjoyment that we put together this issue's compendium of what we consider the best and worst of 1984. We have compiled an admittedly somewhat biased collection of our favorite and not-so-favorite milestones of the year.

Incidentally, you may wonder why we collected exactly 26 of the year's best microcomputer trends and products. Well, why not?

The Business of Graphics

One aspect of microcomputing that is really coming into its own is graphics. It's only in the past couple of years that the software industry has been able to provide businesses with anything approaching the sophisticated imagery that mainframe machines have been producing for years.

Therefore, we're running a series of articles dealing with the new software and hardware systems that are now becoming available to PC users. We asked Jack Bishop and Kathryn Alesandrini to look into the mass of new graphics software that's now coming on the market. Meanwhile, Tom Christopher and Robin Raskin try out new packages that combine hardware and software into complete business graphics systems. Diane Burns and S. Venit discuss whether the Samurai system could replace mainframe graphics. And finally, John Fowler compares the sophisticated images produced by the Cray mainframe computer to those produced by the PC and wonders whether the PC microcomputer may ever join the Cray in the graphic big leagues.

All in all, a very colorful (ouch!) issue. ■

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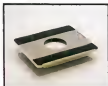
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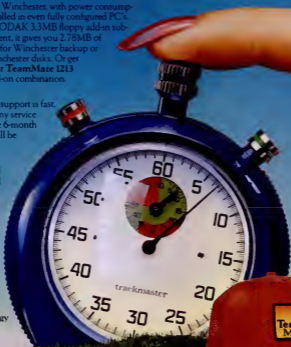
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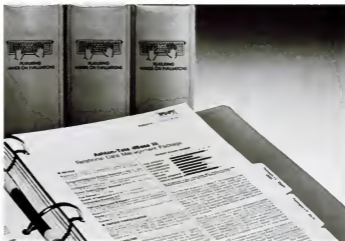
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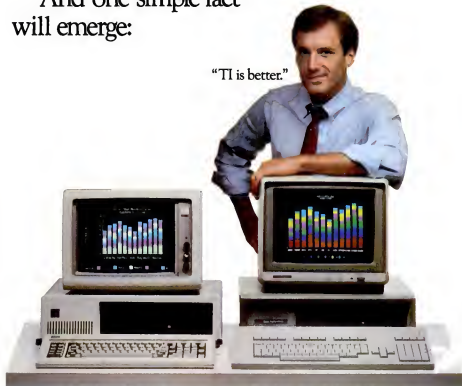
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IBM News

FROM THE EDITORS OF PC

JANUARY 8, 1985

Hard Disk Disasters: Tape It or Leave It

By ignoring hard disk backup precautions, many businesses risk destruction of their data—and IBM may be to blame.

BY CHARLES BERMANT

NEW YORK—The horror stories are becoming routine:

● A Manhattan metal-trading firm bought a 12-megabyte hard disk system and a sophisticated accounting package, but begged off when the dealer suggested a tape backup or an auxiliary power supply. A few months later, the power died as employees were making additions to the firm's customer list and the entire client base was permanently lost.

● A Phoenix certified public accountant acquired an expensive Tallgrass tape backup system with his PC-XT. He used it irregularly at first and then not at all. One day the hard disk just didn't work. The backup system, by then gathering dust, was useless. It took more than 16 hours to restore the data.

● A New York accountant ran his business for 3 months without backing up. One day his secretary decided to format a floppy disk and forgot to type "A:". Everything was irretrievably lost.

Even some who should know better have failed to protect themselves from hard disk disasters. The director of marketing for a Dayton, Ohio, ComputerLand was using a PC-XT for sales forecasts, inventory, and vendor-product lists when

the hard disk unexpectedly stopped working. The warranty replaced the bad hardware, but the data was never recovered.

The introduction of the PC AT, coupled with the PC-XT's price drop, has induced more and more businesses to jump on the IBM hard disk bandwagon. Unfortunately, there are some discordant notes in the song

they're hearing. By not offering a simple comprehensive backup system as part of its hardware line, IBM has lulled many users into a false sense of security.

And for those who do want the security of backed-up files, IBM offers only an exasperating and backbreaking process that can take as many as 30 floppies to accomplish. It is too incon-

venient, time consuming, and annoying for most to bother with on anything resembling a regular basis.

"Show me one person who backs up regularly on floppies," says James Stevenson, president of Strategic Planning Group in San Diego, "and I'll give you a nice, crisp \$50 bill."

No Premiums

Users, quick to embrace multi-megabyte storage systems, have been less eager to purchase the peripherals that will insure their critical data against loss. Insurance, in fact, is the name of the game. Backup is akin to life or health policies, requiring a significant cash outlay for something that may or may not be needed. The money spent may be resented, but at (continued on next page)

IBM Grants Aid for Computer Literacy

Big Blue's support of NCTI will help train thousands of teachers.

BY WENDY MCKIBBIN

FREMONT, Calif.—"School Wars"—the corporate struggles to become dominant computer forces in America's educational institutions—are just beginning, and it's already clear that IBM intends to launch major offensives in the battle for supremacy. Writing to Read and other program offerings are Big Blue's wedge in the educational software battle. Major grants to American colleges and universities, coupled with significant

and aggressive pricing discounts on hardware to school systems and teachers, should make the PC a persistent presence in education.

IBM's latest salvo in the battle was announced here early in October. The company is providing both hardware and development funding for a new commercial enterprise started by Bruce Fredrickson that plans to train over 25,000 elementary and secondary school teachers

in computer skills by year end. Goals for future enrollment run well into six figures.

Ex-teacher Fredrickson has garnered support from both IBM and The Source in setting up his commercial training centers, known collectively as The National Computer Training Institute (NCTI). His goal is to put more teachers on "speaking terms" with computers in order to make better use of the largely (continued on page 35)

Tape It (continued)

least the purchaser of a tape backup doesn't need to pay a monthly premium to stay protected. A one-time fee is sufficient.

When a crisis hits, however, those caught without tape backup are invariably as panic-stricken as those caught without conventional types of insurance. And neither victim will allow himself to be so trapped again. Of course, by then it's often too late.

"People are starting to gear up for hard disk crashes," says Stevenson. "Just because a machine has the IBM name, it doesn't mean that it won't fail. To draw an analogy, pilots say there are two types of fliers: those who have made a wheels-up landing and those who will."

"You only need to go through it once. It's a rite of passage."

The reluctance to make tape backup procedures a regular part of the business day has more than a trace of irony: initially, computers met with resistance because they weren't trusted. Today, data is being lost because the machines' reliability is taken for granted.

Setting an Example

Because IBM has not included tape or any other backup systems in the PC, many people incorrectly believe that it just isn't needed. It is rumored that tape backup was once planned for the PC, but there are apparently no immediate plans for IBM to offer a tape backup unit.

IBM's suggested safety procedures, daily floppy backup, is an agonizingly slow process. This makes it, as one might suspect, an uncommon practice: Operators who bought a computer to save time refuse to spend a significant portion of the business day on such a routine task, especially on a machine whose initials have become synonymous with reliability.

"We're committed to hard disk and diskette technology," says IBM spokesman Mike Reisman. "To not manufacture a tape backup was a business decision. We saw diskettes meeting the needs. Compatible tape backup systems are available if

you want them, but we have no plans to offer them."

"Of course they say that now," says Dave Knapp of Maynard Electronics, which manufactures a portable backup system. "Most people now realize they need a better backup than a floppy, and there's a good chance that if IBM approved

type of storage. We found that the ability to back up hard disks with floppies was adequate but inefficient, and identified the need for more efficient backup. With add-ons, having things hanging off the side makes the system end up looking like an octopus."

"PC users are not aware of



one and offered one everyone would want one."

Long Shots

Knapp speculates that IBM may in fact have a tape system up its corporate sleeve, but he has not been able to find a manufacturer that can meet price and volume needs. He adds that if IBM introduced such a system and could not meet demand "it would be better for us." If they could meet the demand, he says, "it wouldn't necessarily hurt the third-party manufacturers, but would probably slow down our growth."

"The long shot is that they have found a better way," Knapp says. "But I don't see any better way than tape in the next year or two."

Compaq, the Houston-compatible manufacturer, broke new ground last year with the Deskpro, which was marketed with a built-in tape backup. The action was taken, says company spokesman Ken Price, on impetus from dealer suggestion.

"Our competitors either don't understand the market or can't develop the technology," says Price. "There has been an increasing need for more than one

what can happen when they make a mistake," says Ken Cruden of DEI in San Diego, which pioneered much of the tape backup technology. "There is a naivete. If someone buys a floppy program they know to make a copy, but they don't know to do the same with their database."

Laziness

It is input from retailers that prompted Compaq's tape backup move, and it is the dealers who are most convinced about tape's viability. Cynics say this is no surprise, as a backup configuration can significantly increase a dealer's profit margin.

But it is the dealers who must sympathetically listen to data-loss horror stories when they occur: "We tell every customer about tape backup," says Rocco Mondo of Entre Computer Systems in Altamonte Springs, Florida. "It makes us think we are doing our job correctly."

New computer users may walk into their local store with a budget in mind, having already added up monitor, printer, and modem costs. When they are told that their hardware budget can increase by a third, they find

that news to be unexpected.

Many dealers say that customers don't believe them when told tape backup is needed: "They're suspicious, or they see it as a necessity that they will address later," says Brian O'Halloran of Interdynamics Data Systems in New York. "They postpone the decision, it's not a priority."

"People are lazy," says Jeffrey Strub of ComputerLand in Phoenix, in an often-echoed statement. "But scare tactics will work."

Blind Leading the Deaf

Even those who know how important backup can be, according to some observers, may be the least likely to follow the procedures.

"I'll bet," says Daniel Doman, manager of technical support at ComputerLand in New York City, "if we looked into your house system at *PC Magazine* and asked people how often they backed up they'd give us a sheepish grin, as if nothing could ever happen. Many people don't back up as often as they might tell other people to."

Doman should know. During one recent marathon session, he was running the store system for days on end. They were too busy to stop for a backup. When they accidentally wiped out a drive, they lost applications and testing programs. While Doman claims "nothing critical" was lost, one suspects he would rather not have spent 4 days recovering that data.

"As a rule of thumb," says Doman, with his own high-tech version of Murphy's Law, "if you back up every day you'll never need it; if you don't, you will."

The scandal is, of course, that IBM has made it arduous and inconvenient to hack up every day. Even more troubling is the false sense of security so many companies feel as a result of IBM's decision not to include a "viable" backup system. Domain's rule of thumb, regrettably, may end up as an epitaph for many businesses that are now entrusting their precious data to hard disks that may not be all that trustworthy.

Computer Literacy (continued)

untapped educational resources that computers and telecommunications offer.

Although the pilot course started in October, NCTI officially opened in November with 90 centers located in major American cities. Each center, staffed by two professional teachers, is equipped with two modems and 15 IBM PCjr computers with 256K RAM each, color monitors, graphics printers, and a wide range of applications software.

Rapid Growth

Fredrickson expects to double the number of training sites by the end of 1985, thus putting 75 percent of the teachers in America within an hour's drive of a training center. This is important, he says, considering that the courses will be taught on weekends, evenings, and vacation breaks. Since the training centers are located at schools and universities, equipment will be used by children during the day and teachers in the evening.

The first course taught by NCTI will be a 45-hour, 3-semester program that will earn college credit for the teacher who completes it. The cost of the program is \$195 plus the charge for university credit. The classes will be limited to 30 students who will be divided into 15 teams of two, with each team assigned to a PC. Company president Fredrickson maintains that this type of "hands-on team teaching" is the best way to help the neophyte overcome resistance to personal computing.

Entitled "Using Computers Personally and Professionally: A Realistic Course for Educators," the program will cover the essentials of word processing, spreadsheets, graphic arts and databases. The lessons are designed to give teachers a working knowledge of BASIC programming and telecommunications procedures and to acquaint them with a wide range of applications software. And at least one lesson will focus on how to implement instructional computing in the classroom.

The company plans to introduce several more courses by



Teachers take on the role of students at NCTI training sites.

the end of 1985.

Fredrickson stresses that the program is intended to do more than outfit educators with computer skills for classroom use. He is unfailingly optimistic that his students will get excited about personal computing at home. If he can fill this formidable order, he thinks it will ultimately lead to more creative programs during school hours.

"There are endless ways to harness the computer in a learning situation," notes Fredrickson, "but up until now most teachers have been on their own in mastering the micro-computer. They have been voices in the wilderness, and it is past time for these early pioneers to get some help."

The industry has in fact offered a generous helping hand

in support of the NCTI program. The PCjr systems in the centers are on loan from IBM, which has provided additional aid through development funding. IBM's Bob Wallace, manager of industry marketing for the Entry Systems Division in Boca Raton, Florida, partially explains his firm's involvement in the new company by calling the NCTI program "the most thorough, the best organized, and the most thoughtful project of its type that we have seen."

IBM Helps

Wallace adds that with the best educational software imaginable, there would still be "PCs gathering dust in the classroom," unless the teacher in charge were computer literate. He also notes that IBM's loan of equipment is only a drop in the bucket compared to the system requirements for exposing all of America's children to computers.

"We estimate that it would take between 4 and 5 million systems to give 20 minutes of computing to every child in the United States," says Wallace.

Another buttress to the new training company comes from Source Telecomputing Corp., which is contributing 100 memberships and 10,000 hours of free time on The Source to NCTI. Not only will The Source be an integral part of the curriculum in telecommunications techniques, but it will also link the nationwide training sites. Fredrickson envisions using the network as a means for organizing registration through a central office in California and for doing on-line educational software reviews.

"We have to communicate with 180 staff teachers on a daily basis, in addition to coordinating a massive registration procedure," says Fredrickson, in explaining the role that The Source will play in his organization. "If we can set up educational reviews on-line, we will save everyone in our group a lot of time."

Interested parties can receive more information on the NCTI course by calling (800) 425-NCTI or, in California, (800) 626-NCTI. ■

Do Disks Have a Laugh Track?

Thousands of Source users are readers of Newsbytes, that network's excellent weekly bulletin of computer news, edited by Wendy Woods. Newsbytes can be found by following The Source's menus into the user publishing category.

Only a few hundred have tracked down another service on The Source, called Comedy By Wire. In television terms, Comedy By Wire could be titled "Not Necessarily the Newsbytes," since its author exploits the computer newsletter format to present his excellent send ups of software and PC-celebrities.

Here are a few topics covered in the first few issues of Comedy By Wire: portable multi-user lap computers, *byte* magazine publishing nude photographs of Steve Jobs, joysticks that control movements of fish in your aquarium, and BASIC source code for an Andy Rooney emulation program.

This monthly dose of digital humor is served up by William Coronel, who is a stand-up comedian when off-line. He claims that William really is his name—and that his IBM PC is named Macintosh.

In the tradition of *Saturday Night Live*, Coronel could be called a "Not-Ready-for-the-Main-Menu Player," since Comedy By Wire hasn't yet been charted by The Source's menu masters. To find this newsletter, you have to enter the following handful of characters after a command-level prompt:

→WHOM;BASICV SFILFS>BBJ906>COMEDY

One hint: when you get to Comedy By Wire's menu, beware of any file without a name. There are some things it's better not to know...

—James Langdell

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PMate has variables, if-then statements, loops, if-then-else, and converts macros) to text to binary and back. You can write compact programs (called "macros") to delete comments, for example, or check syntax, or process long sequences of commands, do row and column math, perform a series of operations on multiple files, even summon other macros.

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BASIC C

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If you're getting the message that switching from BASIC to C would be prudent, you're about to discover that it's not as basic as a different sort. BASIC is full of hidden functions that stripped down C just doesn't have.

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Lattice C™ is the unparalleled choice for program development. Byte said: "The Lattice C compiler produces remarkable code, outstanding in terms of both execution speed and code compactness." After reviewing nine compilers for the PC, the PC Tech Journal unequivocally declared Lattice C "best for software development: it compiles fast and produces fast programs."

Lattice C is a full implementation of Kernighan and Ritchie not a subset, plus extra features such as nested comments, and 39-character variable names. Lattice C runs on virtually any computer using an 8086 or 8088 microprocessor. Create your source file with any

word processor or text editor like our Prime on ES/P for C and Lattice C will compile them into Intel 8086 object module format for linking with other modules by DOS Link or our Plink86.

Lattice C offers a choice of four memory models which allow the program designer to choose the right combination of efficiency and size for an application: a range between 64K and RAM capacity for program and data.

The compiler comes with a library of I/O routines which implement under MS™ DOS most of the Unix-compatible standards described by Kernighan & Ritchie, a full set of transcendental and Unix math functions K&R didn't think to mention, and some of Unix's most useful options such as Fork, to pull another program into memory in parallel, branch to it, and return. Lattice C will also automatically sense and use the 8087 chip.

The documentation, which byte says "is such a high standard of excellence that others don't even come close," covers the interface to assembly language and machine dependencies. Needs 128K

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Debugging programs without special tools is like fixing an automobile without lifting the hood. PFTX86 lets you see inside your program while it's running. Multiple windows show program code and data, breakpoint settings, and current register and stack contents simultaneously. You can make changes by moving the cursor into a window and typing code in the program window, bytes, words, addresses, and strings in the data window. It has an m-line assembler, so you can enter program modifications in assembler at run time.

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News In Brief

Special Deliveries... Western Union has announced an agreement with IBM to bundle its electronic communications software with the IBM PC. The agreement authorizes Western Union to act as a value-added dealer for the PC.

Western Union's **EasyLink** electronic mail service and its communications software, **Instant Mail Manager**, are now bundled with the IBM PC and a 1200-baud Hayes Smartmodem. The entire package is available for \$4,030, approximately 5 percent less than it would cost to purchase the three items separately. Larger volume discounts are available on orders of five or more.

The bundled PC is not available at retail but can be purchased directly from Western Union through its 400-member national direct sales force.

Quit Playing Around... Infocom, the text-adventure game maker, has created its first business software product—a database system called **Cornerstone**. Like Infocom's highly successful science fiction and mystery interactive-fiction software, its database manager is designed to make nonprogrammers feel comfortable with computers.

Cornerstone's help and options keys are always available to trigger context-sensitive explanations that are based on the structure of the database you have created. The program's ease of use doesn't reduce its range of features. For example, you can modify your database at any time.



An automatic wraparound feature allows data of any size to fit into a field without requiring you to specify a maximum length in advance. The sorting process lets you use English-language commands, such as **AFTER JULY 1980** or **BEFORE YESTERDAY** or **BEATLES... KINKS INCLUSIVE**.

Cornerstone requires at least 256K and DOS 2.0 or later. Its list price will be \$495 when available from this Cambridge, Mass., company on January 31, 1984.

One Diskmanship... Compaq Computer Corporation has increased the storage capacity and operating speeds of its line of Deskpro personal computers.

Available as optional enhancements to the four Deskpro models, Compaq now offers an additional 10- or 30-megabyte fixed disk and a high speed 8087-Z math coprocessor.



Compaq adds a 30-megabyte hard disk to its Deskpro line.

The additional drives can be added to new Deskpros, or they can replace the 10-megabyte hard disk already available on the machine. The 30-megabyte maximum storage capacity is 10 megabytes bigger than that of IBM's new AT.

A spokesperson from Compaq said that the option to add the additional disk drives makes the Deskpro a "completely expandable machine. We believe this is better than what IBM does; with IBM computers, when you want the newest model, you have to get rid of your old one."

Compaq says that the enhanced Deskpro computers with the added storage capacity are especially suited for handling large databases and local area networking. The optional 8087-Z coprocessor will give Deskpro users a faster operating speed for scientific, engineering, and financial analysis applications.

The 30-megabyte fixed disk costs \$2,995, and the 10-megabyte fixed disk costs \$1,695. The 8087-Z coprocessor costs \$375.

More information can be obtained from Compaq, 20333 FM 149, Houston, TX 77070, (713) 370-7040.

Sudden Change... David C. Cole has surprised industry watchers by resigning as chairman and chief executive of Ashton-Tate Inc. Cole had replaced George Tate, one of the cofounders of the Culver City, Calif., company, who died unexpectedly of a heart attack in August.

Cole will not yet disclose where he is moving to and will only say that it is a "large, East Coast corporation."

Ashton-Tate, most recently known for its integrated software package **Framework**, has not announced who will permanently take Cole's place. The interim chairman will be Carmelo J. Santoro, chairman and chief executive of Silicon Systems Inc. and an outside director of Ashton-Tate.

Although sales of **Framework** have been lagging behind that of its fiercest competitor, Lotus Development Corporation's **Symphony**, Ashton-Tate representatives say that this sales problem is not the reason why Cole left the company.

—Compiled by Jane Mintzer, Charles Berman, Virginia Dudek, and James Langdeil

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172.4, 172.5, 172.6, 172.7, 172.8, 172.9, 173.0, 173.1, 173.2, 1

Home Work Increasing Despite Union Opposition

PCs are converting homes to electronic cottage industries, but labor unions fear abuses as management cuts costs.

BY MARTIN PORTER

LUGOFF, S.C.—Each night after she tends the chickens on her farm here, Cindy Coombs sits down in front of her IBM PC. In 3 or 4 hours she keys in about 700 coded lines of Blue Cross And Blue Shield claims: earning about \$70 for the evening's work.

Coombs used to keep more traditional hours, traveling by car to the Blue Cross And Blue Shield office 13 miles away in Columbia. But since May 1983 she has been part of the company's Cottage Keyers program and has entered the ranks of an emerging employment breed: the telecommuter, someone who goes to and from work while staying at home.

Its advocates claim that telecommuting promises new freedom for office workers as well as bottom-line benefits to companies in terms of higher productivity and lower office overhead. According to organized labor, though, telecommuting looks like a computer-age excuse for exploitation.

The issue is here to stay. "Telecommuting is going to become a part of the American lifestyle," predicts Michael D. Jones, director of training for NYNEX, the Bell System spinoff in New York and New England, which recently completed a 2-year telecommuting pilot program.

Home Studies

Its findings have resulted in a decision to devote 10 percent of the space in its new Datagroup computer stores to telecommuting displays, featuring IBM PCs, PC compatibles, modems, and home office accessories such as answering machines.

IBM has taken interest in the

phenomenon as well—though a spokesman said the company has no telecommuting plans for its employees at present. It did join a dozen other Fortune 500 companies last year in sponsoring a \$200,000 study of telecommuting, conducted by Electronic Services Unlimited (ESU) a New York consulting firm. The report found that about 100,000 people now telecommute to work at least part of the time, and that current technology and job descriptions could allow up to 7 million people to work at home a few days a week.

"With the advent of the personal computer," says Marcia M. Kelly, ESU president, "it's old fashioned to go to work, because we have the tools to bring our work wherever we are."

Observers agree that most telecommuters today are managerial employees and professionals such as free-lance writers, business consultants, or

computer programmers.

Still, there are signs that telecommuting may become widespread among the clerical ranks as well. Thirty of Cindy Coombs's co-workers at Blue Cross And Blue Shield participate in the Cottage Keyer program, linking their PCs by phone to the corporate mainframe. A small number of workers for the J. C. Penney Company take catalog orders at home workstations in Milwaukee, Atlanta, and Columbus, Ohio, and the company has announced plans to extend the practice around the country.

Union Troubles

The labor unions, meanwhile, don't like telecommuting one bit. The AFL-CIO, for instance, wants this kind of computerized home work to be declared illegal on the grounds that minimum wage, overtime, and child labor regulations cannot be enforced on dispersed,

private worksites. "Our concern stems from the long history of abuse connected with home work," says John Zalusky, an economist at the AFL-CIO's Washington headquarters. "There's no evidence that it would not occur again."

Traditionally a common practice in the garment trade, home work summons up turn-of-the-century images of immigrant women bent over sewing machines in gloomy tenement apartments, with their small children laboring alongside them. Though home work was outlawed in 1941 under the Fair Labor Standards Act, Secretary of Labor Ray Donovan has tried repeatedly since 1981 to lift the ban to make way for home work on new high-speed knitting machines. In early November, the Labor Department legalized home knitting, authorizing federal inspections to monitor home work for wage and hour violations.

However, observers agree that the dispute over home knitting is only a warning shot in the long battle over telecommuting.

While its on-site office workers are paid a salary with fringe benefits, Blue Cross And Blue Shield pays Cindy Coombs 10 cents for each line of claim data she codes and enters. She receives no benefits and must pay the company a \$200 monthly rental fee for the computer. Yet, she says she processes claims two or three times faster than the company's ordinary production standard. She also makes more money per hour than she used to and says she likes her work more. Blue Cross And Blue Shield has a waiting list of employees who want to join the Cottage Keyer program.

Jack Nilles, a University of Southern California futurist credited with coining the term "telecommuting" 10 years ago, denies that computer home work presages the return of the sweatshop in electronic form.

"The unions' position is an overreaction," he says. "In some cases there will be exploitation, but a more rational approach would be for the unions to come up with ways of protecting workers who work at home."

When In Doubt, Say IBM

IBM may already be a winner in a race it hasn't entered. In a survey on executive workstations, IBM was identified as the market leader in that field by 60 percent of respondents from companies that didn't already own such systems.

As of now, however, IBM doesn't even offer an executive workstation, at least not as defined in a new report from Venture Development Corporation (VDC). To qualify, a workstation should be a single unit with at least nine built-in functions, such as spreadsheet computing, records management, schedule planning, graphics, personal rolodex, text production, electronic dictionary, electronic mail, and voice communications features.

Although IBM doesn't pack all these features into one system, existing hardware and software can add most of them to a PC. Naming IBM as the leader in this unentered field is more than a knee-jerk salute to Big Blue. It's a sign that many executives are willing to get effective tools the hard way.

This report, *U.S. Executive Workstation Markets 1983-1990*, is available for \$2,950 from Venture Development Corporation, 1 Washington St., Wellesley, MA 02181.



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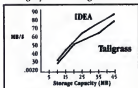
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Latin Bombshells Burst Over New PC Market

Trade restrictions south of the border have IBM and its competitors scrambling across the river.

BY MARTIN PORTER

EL SALTO, Mexico—Carrying an IBM PC into Mexico is as illegal as smuggling a truckful of illegal aliens north across the Rio Grande. Such is the irony of October's announced "tentative agreement" between IBM and the Mexican government for construction of a \$300 million PC plant in El Salto, Jalisco, Mexico.

The move will not only implant the PC for the first time on Mexican soil and create a new supply of foreign-assembled PCs, PCs, XT's, and AT's for American consumption. It also indicates a breakthrough in a Mexican government policy that restricts the flow of foreign-made microcomputers into that country.

Up till now, Fortune 500 companies with strict rules to buy "only IBM PCs" have had to buy compatibles to outfit their sales offices with computers in Mexico. The same is true in Brazil, which also carries a policy against micro imports. Tourists returning home to these countries from a PC buying spree in the States routinely have their goods confiscated at customs.

Yanqui Come Here

Both Mexico and Brazil adopted these protectionist policies to halt the desktop computer trade in hope of stimulating domestic computer businesses of their own. If, for example, you want to be compatible with the MS-DOS world in Brazil, you must buy a local PC lookalike named Cobra. In Mexico, you can buy familiar compatibles called Columbia, Corona, or HP-150, but not the original PC.

Of the two countries, Mexico has been the more flexible in accepting the initiatives of the micro gringos from the north. According to a U.S. Commerce Department spokesman, the Mexican government has "unofficially" adopted a plan to be fully self-sufficient of mini and microcomputer imports by 1988. At that time, 70 percent of those computers must originate from a "local source."

If a foreign computer company won't commit to local production, even at a later date, it won't be granted an import quota: the first step toward receiving an import license. Thus the IBM agreement will open Mexican borders to PCs even before the first CPU rolls off the El Salto assembly line.

Mexico's policy has indeed caused U.S. companies to invest heavily in Mexican-owned operations. Last spring Hewlett-Packard and DEC Sociedad de Fomento Industrial entered into a joint venture to manufacture and distribute the HP-150 touchscreen PC and "future HP personal computer products" in Mexico. DEC owns 51 percent of the new company, which is headquartered in Mexico City.

Columbia is also evaluating possible Mexican joint venture arrangements. In the meantime, Columbia purchased in Mexico have all been final-assembled there. "We don't want to inspire our competition to look into the marketplace. But we have found it to be a legitimate one," says Columbia chief executive Bob Cross. The Mexican microcomputer market is estimated at 30,000 units per year.

Going South

IBM has been eyeing Mexico as well, and its anticipated PC manufacturing scheme may exempt Big Blue from the protectionist policy that the Mexican government has already fostered on its competitors.

International news reports last month quoted Mexican officials saying that IBM is nearing a "tentative agreement" with the Mexican government for a major PC plant there, capable of producing half a million PCs over the next 5 years. The factory would produce the entire PC family of products, primarily for export. This operation would be located in an existing IBM plant that currently makes the System 36 and Selectric typewriters.

An IBM spokesman would not confirm or deny the progress of its talks with the Mexican government. However, IBM did announce last spring that it was actively pursuing negotiations for the sale and assembly of microcomputers in that country. At that time it was announced that IBM's plan would buy "most" of its components from Mexican suppliers. Uncharacteristically, the terms of the "tentative agreement" with Mexico calls for IBM to retain majority ownership of the new facility.

"The omnipresent IBM is always out there... somehow," was Cross's response to the news.

Protectionism

There are no indications that an economically strapped Brazil will follow Mexico's lead in letting the IBM PC inside its borders. A new "Informatics

Law" there prohibits foreign microcomputer makers from entering the market for 8 years and makes it illegal to bring a non-Brazilian-made micro into the country, even for personal use. No joint ventures will be allowed either, once "Informatics" is signed into law.

According to U.S. Commerce Department spokesperson Linda Bower, there are currently 150 microcomputer companies in Brazil. Popular PC-compatible brands include the Cobra, which is manufactured by a government-supported company, as well as machines called Itautec, Labo, and Edisa. "You wouldn't call the technology state-of-the-art," she cautions.

Meanwhile, the computer "pirate" market flourishes there for both IBM PC and Apple II lookalikes. According to U.S. Commerce department sources, Big Blue has filed lawsuits in Brazil for infringement on PC hardware and software copyrights. All IBM's infringement suits have thus far been settled out of court.

Some analysts believe that fear of the emergence of a similar "pirate" market directly across the U.S. border in Mexico was behind IBM's urgency to reach an accord with the Mexican government.

Bye Bye Brazil

There has been foreign political pressure against the Brazilian move. For instance, on a government visit last spring, Secretary of State George Shultz warned the Brazilian government that "any country that cuts itself off from this surging activity [microcomputers] and thinks it can do it itself is doing itself a disservice."

Brazil has stood its ground—so much so, in fact, that even those companies that make computer products on Brazilian soil believe that the adoption of the restrictive government edict is inevitable.

Says Lee Ting, director of corporate development at Hewlett-Packard, which manufactures calculators and instruments in Brazil, "There is a strong feeling about this—very strong feeling." ■

OPINION

Getting In a Fix With Fixed Disks

BY STEPHEN MANES

Maybe it's just my paranoia, but I see a major data security problem in the microcomputer industry that nobody even mentions. In two words, it's called "fixed disk."

With the XT's introduction, IBM took pains to dub its storage device "fixed," not just "hard," and with good reason. The fixed disk is the first non-removable mass storage device in widespread use since the early days of computers. You can yank tapes, floppy disks, or big disk packs out of their drives. With the fixed disk, alas, medium and mechanism are one.

Since there's no easy way to delete the data from the drive, the two go everywhere together. If somebody filches your XT or AT, millions of bytes of your precious data go along with it. But theft, it turns out, is just the tip of this very chilly iceberg.

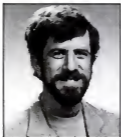
Bonus Data

The first of my colleagues to buy his very own AT discovered his unit's fixed disk imitated the dulcet tones of fingernails upon a blackboard every time the heads went into action. His co-operative dealer swiftly swapped the disk for a unit as quiet as, say, Gavilan Computer's manufacturing plant. The silent replacement disk came complete with a surprise bonus: the entire payroll system for a New Jersey manufacturing firm.

It instantly occurred to my colleague that the person now in possession of his original hard disk might well have access to his entire correspondence file, many of his financial records, and a number of swell programs-in-development. He now spends a great deal of his time slapping his head and telling himself, "I should have reformat the damn thing."

True, but that's not always

possible. What if your machine dies in such a way that you can't reformat the hard disk? An external fixed disk I once tested gave me no end of trouble. When I finally managed to get it up and running, I transferred PC-TALK to it. The next time I turned on the unit, it blew its



fuse. Nothing, including three replacement fuses, would induce it to work again.

Data Swipes

Back it went to the manufacturer—along with my copy of PC-TALK, which happened to contain my passwords for long-distance services and various telecommunications outfits. The company claims it automatically reformats all defective hard disks when they're returned, honest. I changed my passwords anyway.

Turning the Tables on Lotus

Who says that database managers lack humor? During a demonstration of a new database program, one record in a sample list of customer data caught my eye. The hypothetical record was for Mitchell Capone of the Lotus Accounting Assn. Somehow those names sounded familiar...

I looked at the complete file on Capone, which included comments like "Mitch is a very creative guy. Tough negotiator." It said that Capone had tried to start a software company a few years ago, but soon gave up on computers and went back to the accounting business.

This fictional file seems to indicate that at least one software maker would gladly live in an alternate universe where it wouldn't have to compete with Mitch Capone, the creator of 1-2-3 and Symphony.

—James Langdell

There are enough potential ways to swipe data that stealing hard disk units is just the frosting on the cake. For example, walking in with a few boxes of floppies and typing COPY *.* will usually do the trick. But at least other mass storage media allow you to easily remove your precious data to a safe or a distant location. True, you could lock your whole computer in a safe, but you're not likely to do that. With the fixed disk, your data usually stays in harm's way, accessible to people you might not want to have it. That's one reason IBM put a key lock on the AT. Nice, but it won't keep out a determined snoop.

Stick 'em Up

The big advantage of multi-megabyte disks is also the problem: you can keep everything you need right at your fingertips. Your whole life is out there on the hard disk. It's scary if you think about it. You've stored all your passwords and log-on sequences for phone and telecommunications services on that fixed disk. If you use some sort of time-management program, you've got your entire address book and calendar there too. If you're getting into online banking, you may well have put all your bank and credit card account numbers on-line. Don't forget that useful tax-planning and net worth statement.

And then you've got all the important and quite possibly confidential work you got your PC for in the first place. A novel, perhaps, or some elaborate business plan. It's all there, just waiting for some predator to swoop down and gobble it up.

And you thought you'd have a problem if somebody made off with your wallet!

Bit of Prevention

It's easy to say something ought to be done; the question is just what. Clearly, repair facilities ought to reformat any disks they swap into other machines. The various removable-cartridge hard disk systems offer one kind of larger solution. Data encryption also seems like a good idea, but since it requires extra steps, most people probably wouldn't bother with it. Maybe hard disks need an enhanced operating system that demands a password at bootup and automatically encrypts all files. Of course, the day after you pick the password, either you or the software is bound to get amnesia.

IBM's word on all this? The customer is responsible for data security. According to Big Blue, there's no need for any service technician to look at your data, since its official diagnostic procedures don't compromise what's on the disk. But if you don't trust the repair personnel, you can demand that your entire disk be degaussed (and thus erased) while you watch. Even that may not work, though: IBM admits that it doesn't require its repair centers to carry degaussing devices.

Ultimately, I suspect, fixed disks will soon be relics akin to magnetic drum storage devices, and removable storage will once again become the norm. Super high-density floppies of the Bernoulli Box and Kodak variety may capture the low end of the market while optical laser disks will service ultra-high-capacity applications.

But until then, knowing about the problem lets you take some steps to combat it. You might want to investigate one of the many security devices that can help prevent casual access to your machine. If possible, backup and reformat your hard disk before you send your machine in for its 50,000-MB tune-up. Remember, just erasing files isn't enough; a smart spy with a copy of DEBUG can look at every erased file on any fixed disk. ■

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BY PHIL WISWELL

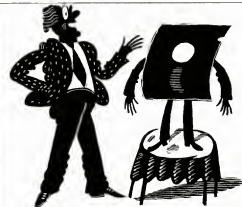
NEW YORK—Manufacturers of entertainment software have never made a strong commitment to the PC games market because the PC has always been perceived as a business computer. But many industry experts expected the market to expand starting this Christmas season, due almost entirely to the re-emergence of the PCjr as a viable home machine.

Trip Hawkins, president of Electronic Arts, which publishes nearly two dozen games and home utilities for Apple, Atari, Commodore, and most recently IBM computers, says, "A lot of companies have held back on games because they saw most of the PCs selling to businesses. But now that the PCjr is really starting to sell well at retail, a market for all kinds of games on the IBM machines is rapidly developing."

Spinnaker Software has supported the PC with games and educational software since the company's founding in April 1982, but backed off to support Commodore and Apple computers when the PCjr failed to take off last year. However, the company rushed to fill store shelves with PC/PCjr game software in time for Christmas. "Within the last 3 months, IBM has begun a price-cutting campaign on the PCjr," says William Bowman, Chairman of Spinnaker. "Suddenly, we have gotten much more excited about the machine's potential."

Adventure, Strategy, War

Spinnaker is first converting its Trilium brand line of science fiction adventure games based on novels by well-known authors Arthur C. Clarke, Michael Crichton, Ray Bradbury, and Alan Dean Foster, because according to Bowman, "people who buy PCs and PCjrs



want deep, strategic, intellectually based games, and adventures are more stimulating than arcade games."

Avalon Hill Microcomputer Games will continue to stress strategic board games and simulations for the PC. Al Roireau, Director of Software Development, says that coin-op thinking for the home is disappearing. His company will concentrate on intellectual challenges such as its new *Incanabula*, in which players must develop civilizations, and *Circus Maximus*, a conversion of the classic Avalon Hill board game.

"We will introduce seven or eight new games for the IBM PC this year," says Roireau.

Complex Play

According to Cathy Carlston, director of marketing for Broderbund Software, owners of PCs can expect far more complex gaming than has been available. She expects game software to take advantage of the PC's tremendous capabilities and predicts products using 128K RAM as a standard.

"As an example," she says, "we are just now releasing a PC package called *The Ancient Art*

of War. It isn't a wargame, but it is based on a Chinese book that established the art of military strategy and tactics."

CBS Software was disappointed with the PCjr's performance last year, and its preschool line of IBM game and educational software did not sell well. Spokesperson Kathleen McGowan says, "We find that most families with preschoolers typically use machines from companies such as Commodore and Atari. Also, you need that graphics board for most of our preschool products—which rely heavily on graphics and icons—and many PC owners don't have it. So we won't be pushing the PC preschool line next year." What CBS will push instead is adult-oriented games.

Adventure Master, an adventure construction set, a second game in the Mystery Master detective series, a leisure activity game, and one that bridges science and entertainment are in the works.

Scholastic Wizzard is also betting on more cerebral entertainment for the PC and an expanded vision of what constitutes computer entertainment. At the same time, Scholastic is counting on sales of the

PCjr and its enhanced graphics capabilities to bolster the PC software market. Rich Kahleel, president, says that people are getting tired of shoot-em-ups and dry educational games.

"A new genre is needed, something between learning and entertainment that will include educational adventures, simulations, interactive fiction."

This is where Scholastic is heading with products like *Agent U.S.A.*, an educational spy thriller by Tom Snyder Productions, and *Operation Frog*, a biology simulation from Interactive Picture Systems.

Snyder admits that it's more difficult to sell games to PC owners than owners of less-expensive computers, but still sees a large demand for adult entertainment. "Games are an extremely good way of showing off the power of a computer," says Snyder.

Leisure Pursuits

Susan Rubin, vice president of product planning at IPS and originator of the *Operation Frog* idea, views the direction for PC games as the direction for PC software in general: "Our job is to create systems that mesh well with the way people are thinking and the kinds of things people need and want to do with their time. We feel the day of the knee-jerk reaction game is rapidly closing, and IPS is trying to pioneer a new form of entertainment to take its place."

It is obvious that there will be no shortage of game software for the PC market next year. Software companies that have marginally supported the PC up till now have strengthened their lines, and companies who shied away entirely are slowly being wooed back by the lure of high PCjr sales to the home market.

But even without those sales, some developers, such as Tom Snyder, have a long-range vision in the business market. He is sure that powerful computers and games for them will continue to make their ways into the home, lugged by a spouse who says, "Well, honey, I've sold the cow, but I still have these magic beans."

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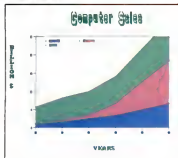
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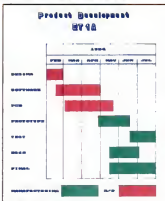
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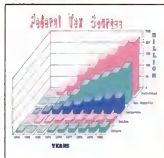
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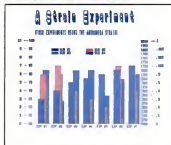
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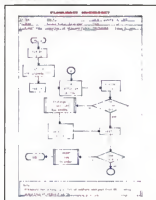
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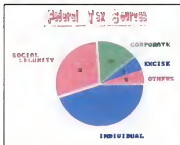
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CIRCLE 134 ON READER SERVICE CARD

PRODUCT REVIEW

Tracking and Taming Wild Hard Disks

A new utility clears a path through overgrown directories.

BY TOM BADGETT

Direct-Tree

Micro-Z Company
4 Santa Bella Rd.
Rolling Hills Estates, CA 90274
(213) 377-1640

List Price: \$49.50

Requires: 128K RAM,

80-column display,

DOS 2.0,

hard disk recommended.

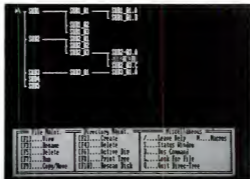
Using a hard disk ought to increase efficiency, but it doesn't always happen. Its high-capacity storage and fast access should enhance productivity and generally make life easier for the user. For many, however, managing this much information in one place becomes cumbersome and frustrating. *Direct-Tree*, a hard disk utility from Micro-Z, can help.

One typical hard disk problem involves keeping track of directory trees, the potentially confusing maze of subdirectories designed to group disk files by type or function. DOS 2.x has a *TREE* utility to show the relationship among files on a hard disk, but, realistically, *TREE*'s quick-scrolling multi-screen display is almost no help. It may, indeed, confirm the neophyte's suspicions that directory management simply is too difficult to grasp.

Hard Shell

Direct-Tree performs a variation of the *TREE* function by displaying an organizational chart of files. Vertical and horizontal lines connect subdirectories on a static screen. You can tell at a glance which directories contain other subdirectories. And, if your naming scheme is well designed, you'll have a graphic picture of your software. If you have a matrix

further *PATH* sequences so you can, for example, point to a BASIC file in the current directory, but tell the utility to load BASIC from the root directory (\) before executing the chosen file. It takes slightly longer to run programs from within *Direct-Tree* because the utility has to do some memory management to keep from writing over itself. When the selected program terminates, the graphic directory tree is displayed,



Direct-Tree's menu pops up beneath an organizational chart of disk files.

printer, you can transfer the chart to paper.

An arrow points to the active directory and a highlighted, block cursor selects other directories from the list. You can ask for a sorted list of files from any directory. You can run a file simply by highlighting it with the cursor. *Direct-Tree* supports

and you're talking to *Direct-Tree* again.

The *LOCATE* command is one of the software's most useful features. It will search the disk for a file or group of files, then display a list of directories containing them.

You can run any DOS utilities or programs from within *Direct-*

Tree, and the tree chart returns to the screen when the program terminates. The software remembers the last DOS command, so if you access the DOS command line again, it displays the last command for editing or a repeat. The cursor movement and other editing keys function as expected, making changing the command line quick and easy.

DOS Is Better

Some DOS utilities are enhanced. During *RENAME*, for example, you highlight the old filename on a directory list and the software prompts for the new name in the command line. You can't run *FORMAT* with *Direct-Tree*'s RUN facility, but you can execute *FORMAT* from *Direct-Tree*'s DOS command line. You can "nest" *Direct-Tree*, running it from within itself to help find files on more than one disk at a time.

On-line help is a single key-stroke away, though it is more of a menu than a conventional help. All of the utility's features can be called with a single key-stroke, either a function key or letter. The function keys are organized in logical groups and the single-letter commands are predictable, so it doesn't take long to memorize the keys you need. A single status line is displayed constantly at the bottom of the screen. This line changes as you move to different functions within the program.

The software functions relatively quickly. Of course you can bypass the utility at any time and return to the normal DOS interface. You can execute programs in the usual way from within *Direct-Tree*, but who'd want to? Why type "Business/WPproc/Articles/WS" to get to your word processor, when you can move the cursor to the Articles subdirectory, highlight WS, and push the Return key?

Users sometimes neglect directory maintenance on microcomputers. *Direct-Tree* can help make this chore easier, while offering menu access to hard disk information. If you use a hard disk—and really use it hard—*Direct-Tree* definitely should be a part of your software inventory. ■

Software That Never Sleeps

Many software ads hype up the product without informing the reader of anything the program actually does. Thankfully, Micro-Z Company avoided that evil in its flysheet for *Direct-Tree*, a shell program that surrounds DOS to make hard disk operations easier.

The ad copy says that *Direct-Tree* displays the entire disk directory network clearly in a tree format and that DOS commands are assigned to function keys. We tried it and found the program actually did everything that the ad promised. It even included the product's price and Micro-Z's address and phone number. You'd be surprised how many computer ads neglect these essential points.

Each description of the bells and whistles in *Direct-Tree* was right on target, but this pitch at the end of the ad was rather low and outside: "It truly is the program you benefit from owning even when you aren't using it."

So what does the software do when you aren't using it? Keep elephants from coming into your office? If that's what Micro-Z meant, *Direct-Tree* seems to live up to this promise as well—we haven't seen any elephants around One Park Avenue since the disk arrived.

—James Langdell

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PC Magazine Jan 8 1985/PC World Feb 1985 Submitted Nov 05 1984

Meeting of the Media

The INFORUM teleconferencing system breaks new ground for better business meeting connections.

BY ERIC FREEDMAN

HARTFORD, Conn.—When executives at the Travelers Insurance headquarters here need to consult with their colleagues in Norcross, Ga., or Maitland, Fla., a new video teleconferencing system eases the exchange of data, displays, and ideas. The PC-based INFORUM system is also an innovative marketing tool to sell Travelers' services to potential clients.

On a larger scale, INFORUM may mean the long-awaited video teleconferencing movement is finally headed for economically firm ground, according to its joint developers, American Video Teleconferencing Corp. (AVTC) and Travelers.

The concept of such real-time exchanges among multiple locations has long been alluring but difficult to achieve. As AVTC president Neil Lewis put it, "Video teleconferencing has not been very successful until now because of its limitations and prohibitive cost." INFORUM, its advocates say, can help because its price tag is only one-tenth that of full-motion video conferencing systems.

It also represents the first time the IBM PC has been "integrated into the teleconferencing environment," according to AVTC marketing vice president Gary Lewis. The marriage of "information processing and videoconferencing" produces a system where participants can transmit color still video pictures of themselves, along with charts, graphs, and images designed or compiled on the PC, while maintaining voice communication.

Configurations

There are three key components of INFORUM: Computers, (both PCs and a host), video, and an audio bridge.

Ronald F. Larity, director of office automation for Travelers, explained, "The real value is in the information-based content from the PC and the host. Video is the supplemental elemental of the system. At incremental cost, the video adds substantially to the communications."

feres and hard copy graphics, and distribute and display PC-produced material. A communications controller connects the PC, video transceiver, and related hardware and software.

For video, the system uses two cameras, two monitors, and a still video transceiver. The



INFORUM combines computer and camera for low-cost teleconferencing.

INFORUM operates on an IBM SNA Data Network with an IBM 308X as the host computer, distributing still video pictures and PC-generated graphic business presentations. Proprietary *Host Bridging* software links teleconference facilities. A room controller operates all equipment through a menu-driven, flat-panel, touch-sensitive control screen that can set up multilocation calls, select and transmit pictures of con-

front camera transmits pictures of conference participants and materials on easels, while an overhead camera sends pictures of transparencies, hard copy documents, and small objects.

The PC serves as the focal point of the teleconferencing system. *Decision Images*, a custom-designed PC software package, creates combinations of graphs, spreadsheets, text, symbols, and drawings. The material can be created on any

PC, stored on floppy disk, and then loaded into a PC at one teleconferencing facility for transmission to other locations for frame-by-frame display. The software makes it possible to modify or recalculate the spreadsheet entries on display, and then immediately redistribute them. Prerecorded audio tapes can be synchronized with the presentation.

A System Is Born

Larity describes Travelers as "an aggressive proponent of the PC," using about 2,000 for its own operations. A subsidiary also markets PC to insurance agencies. An alliance with AVTC began in 1983.

INFORUM began full-scale operation at the three Travelers sites in the fall of 1984. So far, the company uses it for two principal purposes. First, for organizational and tactical meetings and management problem-solving sessions. With five to seven senior managers actively participating at each site, it's faster, more efficient, and less expensive than "putting someone on a plane and sending them back and forth," Larity said. Second, Travelers uses the system for marketing support to introduce clients and potential clients to Travelers products.

The system can accommodate up to ten concurrent teleconferences, and Travelers plans to install video facilities at more of its locations.

The two partners are also marketing INFORUM commercially. System costs run \$143,000 per facility, including network design consultation, hardware and software, installation, training, and project management. There are additional, monthly charges for rental of the optional *Host Bridging* communications software.

Travelers' senior vice president Joseph T. Brophy says the benefits of INFORUM go beyond lowering travel costs: "Its economy is founded on our belief that the value of a meeting is a direct result of the quality of the information that is exchanged or absorbed, rather than the need for participants to see the movement of people in other facilities." ■

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Where's the Disk? AT Floppies Scarce

Shortages are only some of the problems.

IBM's hot new AT has been flying off dealer shelves since its introduction. But early buyers are facing severe shortages of the special high-density floppy disks the AT uses.

Though the standard double-density disks used by the PC and PC-XT can hold 360K, the AT's new standard floppies can salt away a whopping 1.2 megabytes. But high-density drives require a special type of floppy disk. And the sudden demand for these high-density floppies apparently has caught most suppliers by surprise.

IBM guessed that most AT users would want more storage capacity and faster disk read/write speeds but would still prefer the 5¼-inch format. The new drives not only store more than three times as much as the old double-density drives but work about twice as quickly. The key to achieving greater speed and improved capacity is the use of new high-density media, which the manufacturers have labeled in various new ways.

The media for the AT differ from standard 48- and 96-

tracks-per-inch disks in two ways: the degree of coercivity (the force required to magnetize or demagnetize the disk) and the thickness of the magnetic oxide coating. Standard double-density disks have a relatively low coercivity rating of 300 oersteds, while AT drives use media rated at 600 oersteds. Increasing the coercivity means that the size of the recorded data bits can be smaller. And because the magnetic particles are also harder to demagnetize, there are few problems with bit crowding and interference from adjacent magnetic changes.

Thin Coats

In addition, the thickness of the oxide coating on the new high-density disks has been reduced by about half. This reduction means that magnetic flux changes affect smaller areas, further reducing the effects of bit crowding. Although the thinner coating does decrease readback flux amplitude, the decrease is offset by the higher coercivity.

Except for the 600-oersted specification, the manufacturers

of media that format without error on the AT seem unable to agree on a labeling convention. Maxell's designation is MD2-HD (high density); IBM's is 2HC (high capacity); and Dysan calls it UHR-II (ultra high-resolution).

Moreover, micro users who switched to off-name or no-name generic brand disks to keep hi-tech low cost will find themselves frustrated when they upgrade to IBM's Advanced Technology. Until more manufacturers jump on the high-density disk bandwagon, cost will remain high, and supply, at times, will be short. List prices for a ten-pack of the new disks range from \$94 (Maxell) to \$80 (IBM), and as high as \$110 (Dysan). With these disks in short supply, however, computer stores reportedly are scalping boxes at premiums of \$20 or more above the list price.

Switching Problems

The new drives pose a serious potential problem for many AT users. Standard double-density disks will fit in the AT's high-density drive, and the system can read them without trouble. Although a high-density drive can write data to a standard double-density disk, the data may not be readable in a double-density drive (a device that's also said to be in short supply).

In early October, Dysan Corporation reported a 4-week

backup of the new high-density disks created by a significant demand from AT users. Dysan expected the disks to be in most areas by mid-November and available everywhere a few weeks later.

BASF, which has been manufacturing the disks overseas and importing them for the domestic market, was less specific. Until the disks are made in the United States, supply will be uncertain. At this writing, a BASF spokesperson said, "We thought we'd have them by now."

"I don't know what the controversy is about," said Bob Ford, manager of distribution operations for Brown Disk. Ford reported no supply problems. "We've been making a 5-megabyte disk for years, so a 1.6 megabyte is really nothing."

The shortage in some areas could be blamed on distribution. A Phoenix merchant said he had "no idea" when they would be available, while an Albuquerque dealer said he'd been "expecting them for a while."

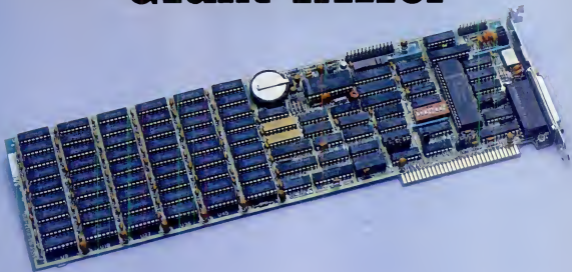
Pete Holste, a 3M executive, said the disks will not be available for several months, probably not until the end of the year. When it was pointed out that 3M trailed several other companies in bringing these disks to market, he responded, "There are many others behind us."

—Michael Finefrock, Brian Hale, and Charles Berman

Calendar of Events

DATE	EVENT	COMMENT	LOCATION	CONTACT
January 21-23	Micro and Personal Computers: Technology and Application	Seminar on the incorporation of PCs and micros into the design of mini and mainframe data processing applications.	Holiday Inn-Union Square San Francisco, CA	Institute for Advanced Technology 6003 Executive Blvd. Rockville, MD 20852 (800) 638-6590 (301) 468-8576
January 24-25	Local Area Communications Conference	Examination of LANs and other information processing technologies for office communications.	Marriott Harbor Beach Ft. Lauderdale, FL	Gartner Group, Inc. 72 Cummings Point Rd. P.O. Box 10212 Stamford, CT 06904 (203) 964-0096
February 20-22	INFO/CENTRAL	Discussion of legal issues involving PCs and the impact of portable computers.	O'Hare Exposition Center Chicago, IL	INFO/CENTRAL 999 Summer St. Stamford, CT 06905 (203) 964-8287

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Jeff Carter

Computers and geography help a former president's son make his own mark on the world.

BY CHARLES BERMANT

McLEAN, Va.—When Jeff Carter created *Statmap*, it reflected his long-held interests in computers and geography. Today, as vice president of his own consulting and marketing firm, Ganesa Group International, he has managed to sell the demographic database to banks, publications, and politicians who seek concise details about the United States of America's statistical makeup.

Of course, he had an advantage. Anyone who deals with, talks to, or looks at 32-year-old Jeff Carter will find it impossible to forget that he is the son of former president Jimmy Carter. For his part, he has not been hesitant to use that connection.

"When I got out of college in 1977, I could have done whatever I wanted with whatever company I wanted," he says without smugness. "Dad was president. I could have gone to work for any big company. But I wanted to do something where I'd have some fun.

"Now I can get in to see anybody in the world. But once I get in, I still have to give them what they want. The stuff I write had better stand up on its own."

Prophet Motive

Carter and two East Indian partners formed Ganesa Group International in northern Virginia 3 years ago, taking the company's name from the Sanskrit word for wisdom and the Hindu god of peace and prosperity. (The other partners left the company in the last 18 months.) The company began with some small consulting contracts, writing *SourceLink*. The Source's self-booting communications program. Ganesa was subsequently acquired by Futuresoft, which has taken on distribution and marketing chores.

Northern Virginia is not a computer center like Atlanta, which Carter prefers, but he



plans to stay put in that area for the next few years.

"We had some existing consulting contracts here," he says. "It's the best area in the world to do computer consulting. First of all, there's the government. We don't do a whole lot of government work, although we just finished one with the Department of Energy."

Several small local firms, he says, have relied solely on government contracts that, when lost, forced them out of business. For this reason, Ganesa sought to build a private-sector base.

"We're a pretty small company," he says. "Many people exist on government contracts down here, but it's hard for us to sit around for 8 months waiting to get paid. Besides, we won't get anything from the Reagan people once they find out who we are."

This hard-edged crack is in contrast to his soft-spoken affability. And when he is later pressed about the comment, it's not clear if he's joking or not.

Both political parties, however, used *Statmap* for local voter drives and analyses, and it was also prominent in the national Democratic campaign. The Reagan-Bush committee's mapping program of choice was

Sammanish, although it also owns a copy of *Statmap*.

Perhaps one of the reasons the GOP opted not to use *Statmap* extensively is that Carter was not available to them for follow-up consultation.

Ambivalence

Statmap was written on the PC-XT, and can be used on PCs and compatibles. Carter, however, acknowledges that there isn't a big retail market for this kind of custom software.

"This isn't the kind of program that you just walk into a computer store and buy," he says. "It's hard to compete with Microsoft or Lotus, and competing with IBM is like competing with Germany."

This comment is indicative of his mixed feelings about the long hand of the company that indirectly feeds him. "I haven't been impressed with IBM's own PC software," he says. "And it's the only company in the world that could get away with selling a four-color graphics card. Anyone else would have had to make it 16 colors for it to sell. And I don't think eight people in the country use EDLIN, that word processor in DOS. What IBM did was make the machine and throw it out and let other people write the software. It

knows that people will adapt to whatever it builds."

But he's not really complaining. "We can move quickly," he says of developing PC software. "By the time IBM or a large company has spec'd out the product and done the market analysis, we've already written the program."

Ganesa employs ten full-time people and five consultants. Carter concedes that his company "will never make \$100 million," but he expects it to clear the \$1 million mark this year. Ganesa, he said, has doubled its business every 18 months.

Running from Office

Being a president's son is something that Carter will never live down. Every few years some magazine decides to run a fluff piece on the children of former presidents. He neither seeks nor dodges this limelight, and does not object to the fact that he probably would not have ignited *PC Magazine's* interest without this filial connection.

While he will reap these benefits for the rest of his life, it will not be in the political arena. He does not share the acumen or the interest of his older brother, Chip, who spent 1984 working for the Mondale campaign and is expected to start his own political consulting firm soon.

"I've never liked campaigning all that much," Jeff says. "In 1980, I didn't go out on the road, I just worked with the computers. Now, I've got a job that I need to go to every day, I just can't take 8 months off. With politics you can't really do it halfway."

If he does participate in some future campaign, then, does it mean he bent to family pressure?

"No one," he says, with a Jimmy-esque grin, "can force me to do what I don't want to do."

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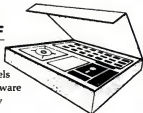
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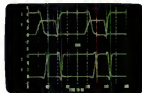
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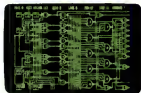


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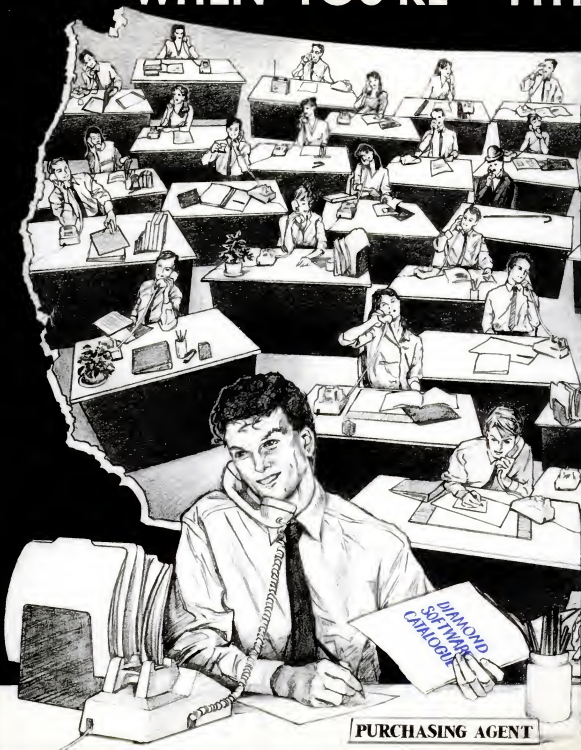
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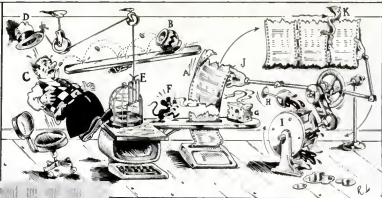
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The Market Grows Up

Just as the PC has evolved from a 16K machine to the trend-setting AT, so have all aspects of the PC market, especially the user, who today is sharper, better read, and more wary.

You can sum up 1984 in a word: maturation. Every aspect of the PC marketplace has grown, seasoned, and changed. The machines are faster, the software better, and the dealers savvier. Products not meant to be have fallen by the wayside. But the biggest change has been in you, the user. You're sharper, better-read, and more wary.

You've sparked fabulous success stories, put companies out of business, driven marketers to distraction, and given hope to innovators. Whether you vote with your wallet or departmental budget, you vote wisely. Product designers and surveyors go to extraordinary lengths to find out what you're thinking and what you're likely to do next.

On the Line

Thom Olsen is a vice-president at a large company that produces high-end accounting software. He spends one Saturday a month in a local computer store—as a salesman. No, it's not the money; he's taking your pulse.

A year ago, he asked customers questions such as, "What do you want the machine to do for you?" He had to ask, because many customers didn't know or had unrealistic expectations. Today, customers typically say, "I need a machine that will run 1-2-3." Thom then shows

them an IBM or a compatible. When he asks if they need a hard disk, they usually know the answer. They decide on the best printer for the application. That leaves only how to pay—purchase order,



Bill Machrone

check, or credit card.

Of course, your increased product knowledge hasn't made it any easier for the salesperson. You're more likely to demand informed answers to your questions; you're not a tire-kicker any more.

Fog Factor

Bob Gilchrist, chairman of DayFlo, recalls his travails as he sought venture capital to bring an innovative database manager to market. "A year ago," he says, "people were confused. When we

said 'DBMS,' they asked how we expected to compete with *dBASE II*. They had no idea that there could be many different, viable database products. Now when we demonstrate the product, they sit up and say, 'Hey, this is new. We haven't seen this before.' "

Gilchrist also claims that the mid-1984 dry-up of venture capital helped the industry: "Money disappeared for frivolous or ill-conceived products. The noise level is much lower."

Call it the noise level or the Fog Factor, it's lower now. Closer scrutiny of new products by consumers increases the survivability of all products. With fewer distractions, consumers are more assured of a product's basic quality.

Even mail order has changed. Once the province only of the courageous or the foolhardy, mail order has become a healthy, vibrant part of the personal computing market. Both sides have matured. The mail-order firms screen products more carefully, document them better, and provide more and better telephone support.

Customers, meanwhile, have a clearer idea of what they want and how much it's worth. Their questions are sharper, more to the point. Though price is important, they're not just shopping for lowest dollar. Quality, support, warranty, and delivery are equally important. (continued)

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PRICING MADNESS

Once again, as Federal Express picks up our ad at the very last millisecond before this issue's advertising deadline, here we sit with dozens of price reductions and new product announcements which have arrived too late for us to let you know.

Why, our ad manager asks, do we always go through a last minute price update frenzy, just seconds before our ad is due at the publisher, when we know that despite our heroic efforts, many of these products will cost even less by the time you read this ad.

How, she asks, can we get a crystal ball to forecast what fantastic promotions and specials our suppliers are going to offer from now to the date this ad gets to the newstand over two months from today?

Well, we decided that she has a good point. While we'll still keep getting our grey hairs and ulcers from last minute revisions, we will start publishing this notice and ask our readers to make a simple check. Look at any four back issues of this magazine (yes we're in every one) and track the prices on the most popular products. You will see that many drop with every issue. Most of these price changes were instituted well before the issue was printed and our members always pay the lower price. This should prove that this notice is much more than hype.

Given the current madness in the PC industry with its spur of the moment pricing and instant product introductions, you will find it always pays to call for our latest prices. You will be glad you did.

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(Prices add \$2.50 shipping and handling for each title ordered from below)

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EDITOR'S SCREEN

A Dangerous Thing

The tremendous growth of the PC market means a wide range of consumer knowledge. Some people have no busi-

ness buying by mail order. Mark Malloy of Qubie Distributing cites the example of consumers who come to the mail-order market solely for price, then are dis-

appointed when they don't get instant, trouble-free results.

Though these customers aren't yet up to speed, they are trying mail order because others have had success with it. As parts of the market aim for more simplicity, the price-shoppers will get better results. It happened with telephones, and it'll happen with computers, too.

The Business of Brand Names

There is also the question of what's more important, the marketing or the product? The media blitz at the 1984 Summer Olympics was a lesson for all. Television viewers who already knew about *Framework* and *Symphony* didn't particularly care whether they saw an Ashton-Tate or Budweiser commercial. Those who didn't know may have been misled into thinking that these products are the anodyne for all computer ills.

A little experience in the real world teaches us the error of our ways. Though brand recognition is important, 1984 demonstrated that the market is not ready for it. Some factions are trying to push the market into changing faster than it's ready to. Thus, maturity takes on a new meaning in a high-tech market.

I won't try to typify these changes as good or bad; they're merely inevitable. It's a rare industry that isn't dominated by one manufacturer. IBM didn't create the market; it just entered it. And although IBM dominates the market, the forces driving the market are bigger than IBM's span of control.

The PC has changed, too. From a sorry little 16K machine with a single-sided drive, the PC has evolved into today's mainframe-challenging AT. The past year brought more technical innovations from IBM than 1982 and 1983 combined. IBM isn't just showing off; the company is responding to the market in its new-found maturity.

In 1985, *PC Magazine* will continue to reflect and respond to the market—not to a machine, an operating system, or a company—but to you, the market. ■

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The Reliability

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More Than Pretty Pictures

PC-generated graphics can solve many business communications needs. But a single package may lack the capability, versatility, or quality to produce all the charts a company requires.

Graphics can make business meetings shorter and more effective, spur decision making, and help the audience better understand the speaker. Computer-based graphics systems, which are steadily gaining widespread corporate acceptance, produce visuals for under \$10 apiece, compared with \$35 to \$100 and up by conventional methods.

Because of advances in personal computer capabilities and the advent of reasonably priced pen plotters, ink jet printers, laser printers, and direct-output 35mm image processors, users now expect the same quality and flexibility from their computer graphics systems as they do from the in-house graphics art department.

Corporate users of PC-based graphics systems want flexibility, quality, and the ability to provide many kinds of charts. Flexibility means multiple plots per page, control of title and legend placement, and the ability to combine different types of charts, such as line charts and bar charts, in the same plot. Quality is an overall professional look: no stair-stepped edges, thick lines, sharp colors, and distinct shading. It also means appropriate layouts for any given medium. At the least, most users want to be able to produce three kinds of output—black and white on paper, color overhead

transparencies, and 35mm color slides.

Most computer graphics systems, especially modestly priced PC-based systems, aren't capable of working with the whole range of output devices needed to



Robert Corr

produce all three types of charts. You may need to use one package for a black-and-white printout, another for overhead transparencies, and a third for 35mm slides.

Limitations

When these limitations become apparent, someone in the organization will ask, "How many of our graphics needs will this package fulfill?" The typical response of "perhaps 50 percent" doesn't sound too bad, but it doesn't mean that

the system will produce the desired chart five times out of ten. The program may be able to create all types of charts—but create only 50 percent of each required image. For example, you may have to laboriously retouch every chart to add a legend or grid lines, or reduce and paste together two charts to fit them on the same page.

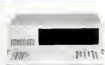
If you print a table that needs another column of numbers or a different title, it is easy enough to retype the chart. But having to add a legend to a color transparency or adding numbers to the tops of the bars on the bar chart may be more difficult.

Although you can cut and paste pieces of a black-and-white paper chart, color slides and transparencies present nearly insurmountable problems. And graphics presentations to top management must compare in flexibility and quality to the graphics art department's work.

Computer-generated graphics can solve many business communications needs. But corporate users must understand the capabilities and limitations of a system before it is installed—not after they get a request for a chart the system cannot produce. ■

Robert Corr is director of marketing for General Motors Information Systems and Communications Activity.

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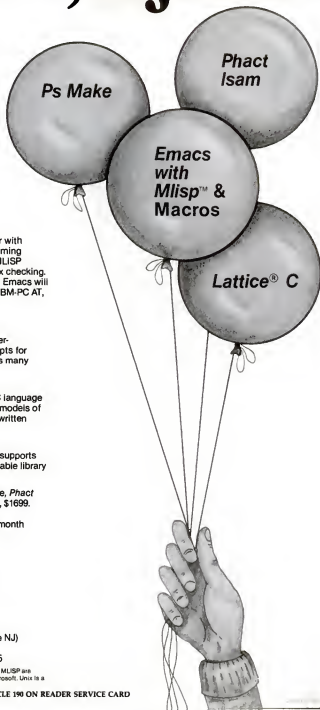
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Letters to PC

A Guinea Pig Squeals

Thank you for Barbara Krasnoff's "Consumer Guinea Pigs" (*PC*, Volume 3 Number 17). I am glad that some people in the industry are stirring up others on behalf of all users.

Your article defines the problem, but there are some unanswered questions. How can *PC* accept advertising from so many software manufacturers that make misleading and false claims about their products? Are your editors and advertising people going to do something to prevent further exploitation of us guinea pigs? Or do we have to keep spending our hard-earned money on falsely advertised products?

I bought my computer several months ago and used *PC Magazine* as a reference to make that purchase. I wish I could trust the claims of the software manufacturers as well.

Murry Brenner
Atlantis, Florida

In Praise of Lumena

After reading Tom Christopher's article "Mindset on Graphics" (*PC*, Volume 3 Number 20), I felt that the other side of



the coin should be shown. The *Lumena* software used with the *Mindset* was not developed for that computer as much as it was downsized to fit it. Time-Arts's earlier *Easel* paint program, and *Lumena* as

well, were designed to operate on systems possessing greater processing capabilities than the *Mindset*. It is a credit to the developers at Time-Arts that they were able to preserve so many of *Lumena*'s capabilities when tailoring it to fit the *Mindset*.

I agree with Christopher's opinion that the *Lumena* operating manual does not boast of great technical writing. The program has over 125 commands and 14 menus, so mastering it does take some time—but it is time well spent. In the best circumstances and in the hands of the right individual, the end result can be considered fine art.

John Derry
Scottsbluff, Nebraska

Updating Your Technical Investing

I'd like to thank you for your kind review of *The Technical Investor* ("Super Software for Technical Investors," *PC*, Volume 3 Number 21). It is a worthwhile service to your readers to present detailed summaries of vertical market programs such as ours. Certainly one of the problems in reviewing a program as large as *The Technical Investor* is catching every possible relevant feature. Along those lines, I'd like to point out a few items that will make the review more complete and further improve the program.

The Technical Investor does have a built-in express update feature. Just enter a question mark (?) when asked for the number of days of data wanted during an update and the program will check each security file for the most recent data, then retrieve just enough quotes to bring the file up to date.

Also not mentioned was the powerful autorun feature—what we call "loop procedures." Any or all of the 38 user

procedures that were mentioned in the review can be used as autorun or loop procedures, and any command that can be issued in the program can be used in the procedure. You can, for example, loop through all the securities on your data disk, or any subgroup of securities, and print out any sequence of charts you wish—initiated simply by pressing one function key.

The program has the ability to store items such as price/equity ratios. The program reserves several file types just for this purpose, allowing the user to store up to 12 different items about a company in this manner.

The Technical Investor can store up to 1 year of daily data for 100 stocks per floppy disk. It can also plot up to 10 years of daily data on the screen at one time. Its error-testing and handling capabilities are quite strong; for example, the program will not attempt to plot a chart off the edge of the screen.

We have just released Version 2 of the program, adding many new plotting commands and other features.

Paul R. Langston
Savant Corporation
Houston, Texas

George C. Hayles replies:

Langston is absolutely right—I did overlook the express update feature. This type of updating is the most convenient way to make sure you have the latest information on the stocks you are tracking. This feature is also available on Summa's Winning on Wall Street (the other program reviewed in the same article).

In order to take advantage of the help-update feature offered by the question mark (?) option, you have to know that the option is available. As a result of PC's review, Savant plans to include this

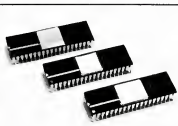
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LETTERS TO PC

option as a menu item on its data update menu in a future release of the program. This will help prevent users from missing some of The Technical Investor's best features.

The Technical Investor is an excellent package and should save those interested in technical stock market investment a substantial amount of time in their stock market analysis.

Pathfinder Unappreciated

As the author of Garland Pathfinder, the recent review in PC left me somewhat disappointed ("Garland Pathfinder: Simple Schedules," PC, Volume 3 Number 21).

The reviewer devoted approximately one-fourth of the article to describing problems with the calendar file and then admitted that most people would not be scheduling a project starting in 1968 anyway. In fact, only three of the other programs reviewed in the "Project Management with the PC" series were able to use this starting date.

The reviewer states that the inclusion of float time complicates the Gantt chart. This indicates to me that the reviewer has possibly never scheduled a project before. I feel that the free-float feature is an important resource. It indicates the amount of time an activity can be delayed and still not have any effect on any of the following activities.

One of Pathfinder's most important features was entirely overlooked. The exception report contains only the activities that currently require action. It will also include activities that will need attention before the next scheduled update run. This is most important when a complex project contains several hundred activities.

Though the program has been well received by people who make their living scheduling projects, it appears that it requires some revision to be equally appreciated by reviewers.

Charles E. Shapler
Toledo, Ohio

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In a recent review of *PC-Write*, Jack McGarvey claims that "it is a pain to have to copy the *PC-Write* files to each other and every disk you plan to use" ("The Word on Word Processors," *PC*, Volume 3 Number 17).

This is a needless pain. I rarely use the text and *PC-Write* files on the same disk. However, typing B: as part of the name



of each text file is much less of an inconvenience. Also, besides being a good word processor, *PC-Write* works well as a source code editor.

Carl M. Anderson
Williamsburg, Virginia

Getting to the Hart of the Mail-Order Price Wars

Dexter Hart's Guest Editorial made some misleading comparisons and erroneous conclusions concerning mail-order price savings before and after the last round of IBM PC price cuts ("Price Manipulation," *PC*, Volume 3 Number 19).

Unfortunately, Hart is comparing the old prices and specifications with the new ones when he really should be comparing his figures to present conditions. A quick check of mail-order prices shows a savings of \$90 to \$100 on a monitor and a savings of \$240 to \$260 on a disk drive over IBM's prices. Further checks into hard disks, modems, and multifunction boards will show other large savings over IBM's price cuts. In addition, IBM has substantially increased production, creating an oversupply of PCs. This has caused substantial retail price cutting on PC system units,



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Mark Malloy, President
Qubie
Camarillo, California

An Alternate Solution

I was pleased to see that you gave the Bernoulli Boxes such a high rating ("The Bernoulli Solution," *PC*, Volume 3 Number 18, p. 148). The Bernoulli Box in our office had a tendency to corrupt cartridges if it was placed on its side, such as beside a desk. So, if your stacked unit is too tall for your 5'6" frame, the obvious solution is to put your PC down on the floor and leave the Iomega flat on the desk.

Gerald Fitzgerald
Cambridge, Massachusetts

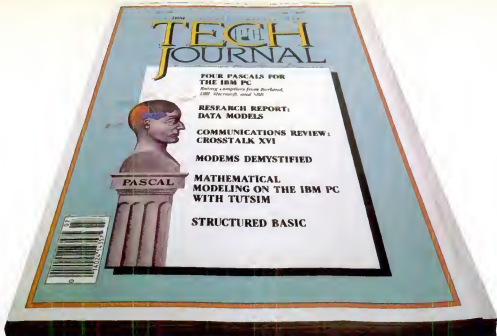
Correction:

There was a typographical mistake in New on the Market. *The PC DOS Companion*, from Howard W. Sams & Co., costs \$15.95, not \$1.95 (*PC*, Volume 3 Number 21, page 316).

How to Write to PC

Do you have a comment, compliment, or criticism about something you read in *PC*? A question you'd like to open up to other readers? Send it to "Letters to PC," *PC Magazine*, One Park Avenue, New York, NY 10016. We are not able to answer letters personally.

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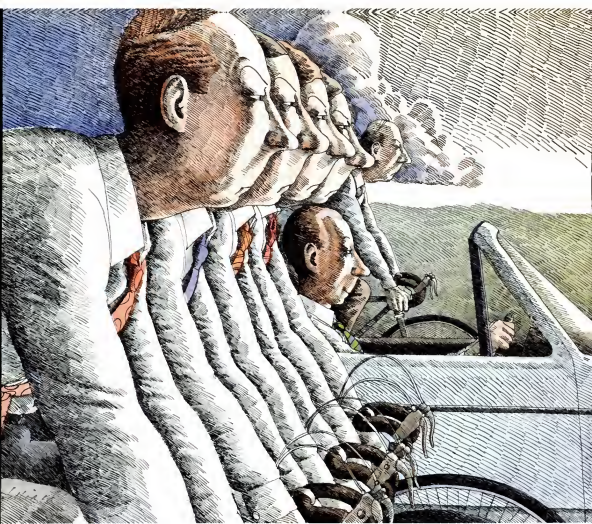
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Hard Disk Housekeeping

Hard disks mean plenty of storage—and old programs gathering dust. Several programs help clear the cobwebs by converting files, searching out files that match, and locating data files.

As everybody who has a hard disk knows, a hard disk helps you work more quickly and effectively on the PC, but it also creates its own special problems—mostly the problem of coping with all that storage space.

A hard disk is like a big attic: You can put in things and forget about them. That's enough of a problem with the 10-megabyte disks that come with the XT and that have become standard as an add-on hard disk for regular PCs. It's an even greater problem for larger disks, like the 20-meg disk that fits into the hot new AT model, or some of the monster-sized disks produced by outfits like Tallgrass.

I had trouble coping with my old 10-meg disk, and, now that I work with an AT all the time, its 20-meg disk has just multiplied my problems. I've been cleaning out the "attic," so I'll tell you about some of the things I've found (also some of my disk management techniques).

Clearing the Cobwebs

Having worked with PCs almost from the first month IBM announced them, I've accumulated lots of programs—good, bad, and indifferent. Many of them, of course, are lost in the sands of a storage desert, on a floppy disk tucked in my closet, gathering cobwebs. But quite a few have made it into my hard disk's

files. During my hard disk housekeeping, I listed the filenames and got a count of them. The task was made easier by a program I've written that searches every directory on the disk for matching files. I



Peter Norton

sorted my disk with it by looking for *.COM, *.EXE, *.BAS, and *.BAT extensions—my program looks in every directory on the disk.

The totals alone were surprising. I have only six BASIC (*.BAS) programs, a general ledger accounting program, and several ad hoc quickies to track the ups and downs of my business.

I have more than 200 regular programs, *.COM and *.EXE files, more than I could use every day. I listed them to sort out the unused ones and exile them

from my disk. While I sift through them for you now, I'll comment on them.

Converting Files

First, out of about 200, 186 of them are COM files, and only 35 of them are EXE files, not because these programs came to me that way. A spiffy program called *SPACEMAKER* from Realia Systems converts most EXE programs into COM format. (DOS's EXE2BIN can't convert most EXE files; *SPACEMAKER* uses some tricks to convert many more EXE programs into COM ones.)

Converting EXE programs to COM format means that files load faster and, thanks to *SPACEMAKER*, often take up much less space on the disk. If you work with floppy disks, *SPACEMAKER* can be an even greater boon.

My Favorites

My day-to-day favorite in my PC attic is the one I use to write and program with. I'm not going to tout *Vedit* from CompuView Systems since you're probably just as devoted to your word processor. And if I weren't married to *Vedit*? No debate: I'd choose *Microsoft's Word*. It's challenging to learn, but it's top-of-the-line and the only word processor that takes advantage of the hot new video adapter cards from IBM.

For many of us, an automated spelling

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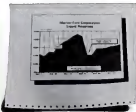
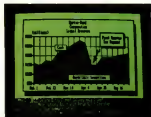


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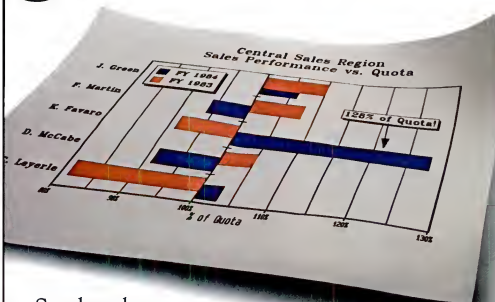
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NORTON CHRONICLES

checker is an essential ingredient of writing on a computer. My favorite is *Word Proof*. Lots of you, bless your souls, love to use *WordStar*, and you haven't been able to use the *Word Proof* spelling checker—because it was incompatible with *WordStar* files.

To the rescue comes a little goodie

Converting EXE programs to COM format means that files load faster and often take up less disk space.

called *The StarProof Bridge*, which solves the *WordStar-Word Proof* file incompatibility problem. *StarProof Bridge* is in IBM's new direct-mail software catalog. (For a free catalog, call 1-800-IBM-PCSW and ask for Don.)

Two resident-type programs are big hits: *ProKey*, the keyboard macro program, and *SideKick*, the pop-up calculator, dialer, and note-taker. These two are the leaders in their fields. *SideKick* is noteworthy because of its reasonable \$80 price. (See "Organize Your Desk and PC," *PC*, Volume 4 Number 2.)

Not so reasonably priced are the "give-away" *SideKick*-like programs that accompany the Tecmar expansion boards. The Tecmar programs are high priced because you can't run them on a computer that doesn't have a Tecmar board in it. Why does that fact make them expensive?

When you work with your first PC, buying an expansion board and using the programs that come with it (and require it) seem simple enough. You'll always have that board and work with just that one computer, right? Fat chance.

Soon comes the day that you work with several different PCs—maybe an XT or AT at the office, a PC or a PCjr at

home, and a lap-size PC to take on the plane. You can't put a Tecmar board in the lap machine.

Our largest investment in our computers is in learning how to use them, particularly in learning the programs' ins and outs. If you're smart, you help ensure your investment in learning pays off wisely by selecting programs that will work for you in the future. A program tied to a particular expansion board—or any other restriction that limits the choice of machine—should be avoided.

Data Path Finders

Data path finders, a category rather than a particular program, work like the DOS PATH command. The PATH command, as you recall, lets you invoke programs stored away in another directory. Once you tell the PATH command what directories hold your programs, you can access those programs from any directory. A great idea that works dandy for accessing programs, but it doesn't work for data files. To the rescue come programs I call data path finders, which locate data files. Of course, subdirectories in disks isolate and organize our data files. But many programs use help files and other auxiliary files (such as the dictionary files for spelling checkers), and we shouldn't have to copy those to our private data directories or copy our data files to the location of the help files.

Data path finders solve this problem neatly and practically. One program I've tried, *File Facility*, has three advantages over most of its competitors: It's inexpensive (\$19.95); it gives you more control; and it's from an outfit you can expect to stay in business (if you guessed Blue, you're right). Like the *StarProof Bridge*, you'll find *File Facility* in the new catalog of cheap and (mostly) good programs from IBM. (A call to 1-800-DON-ESTRIDGE will get you a copy of the catalog.)

I ran out of room before telling you about my organize-your-disk tricks. We'll come to that in a future column. ■

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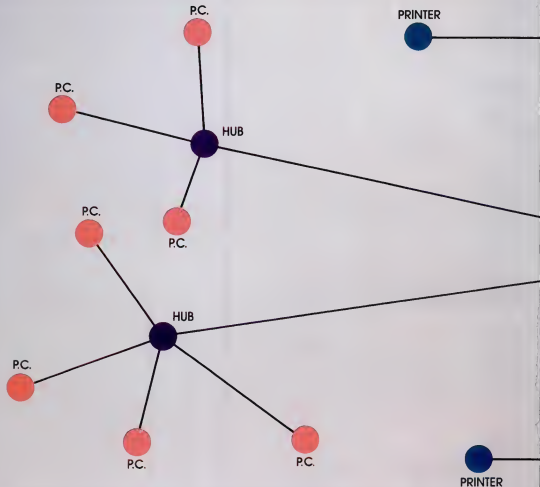
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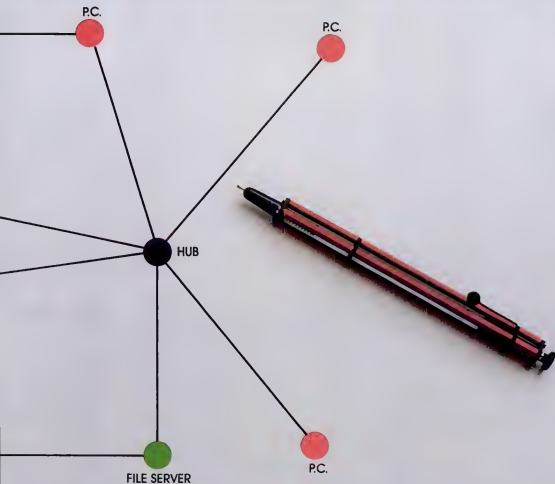
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the dots.



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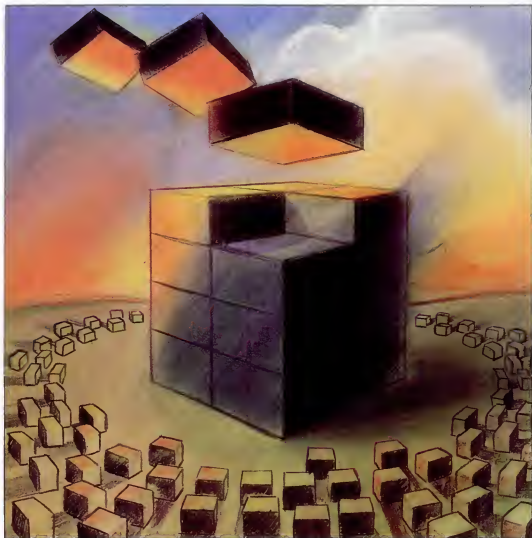
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The microcomputer wave washed in the PC and altered computing forever. Its impact continues, heralding 15 dramatic changes for the next decade.





Looking Ahead: Key Forces That Will Shape The World of Computing

The third wave has engulfed the world of computers—the microcomputer. As it surged beyond the point reached by its predecessors, the mainframe and the minicomputer, the microcomputer wave deposited active elements on the shores of the world of computing. These catalytic agents have now transformed computing, those who use computers, and even the nature of our society and life in this century.

The past 25 years have seen vast changes. The first was the advent of large-scale computers in the early sixties. The descendants of these machines are mainframes or host processors. This technology brought centralized data processing, the professional EDP staff, and the MIS department in large organizations.

In the seventies, the second wave—the minicomputer—decentralized computer processing. Lower-cost minicomputers meant that individual depart-

1

*There Will Be a
Computer on Almost Every Desk
by the Early Nineties.*



ments and smaller companies could afford their own computers. And many more people had access to computer technology, specifically software know-how.

Today, the microcomputer has enabled a new group of hands-on users to participate in the computer world. The lower cost of entry-level hardware and the increased number and quality of software applications are revolutionizing computing. And the changes are just beginning to gather force. They will penetrate more than computing. The entire modern world will experience the effects of the microcomputer wave.

This impact comes when social scientists are observing huge changes in all walks of life. As John Naisbitt argues in *Megatrends*, many feel we must prepare to deal with changes by adopting a new strategy. Naisbitt proposes his megatrends tactic, incorporating careful observation of the present and a continuing review of the past to discern the major patterns of

change that will determine the future.

Taking a cue from Naisbitt, I have looked at the forces changing computing and have identified 15 dramatic results of the microcomputer wave. With a bow to Naisbitt, I call this approach "megacomputing" and the 15 changes I predict, "megacomputing trends." I present the 15 changes—change-agents as well—as the rational basis for megacomputing planning, preparing for the future by broadly analyzing the effects of the microcomputer wave.

In the same way that the telephone, the typewriter, and the photocopier have become basic business necessities, the keyboard and video display will become indispensable tools for every office worker at all levels by the beginning of the next decade. As a matter of fact, many information workers will probably have more than one desktop or portable, integrated workstation: in their offices, their homes,

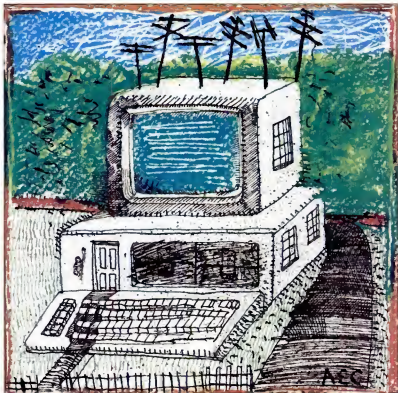
and even in their briefcases.

Low cost is the most important factor responsible for this rapid proliferation of personal computers. Priced at \$3,000 to \$5,000 and offering increasing capabilities, video-based workstations contribute more to an organization while costing less in proportion to the overall expense of maintaining employees. Productivity increases of 5 to 10 percent pay back investment in microcomputers in less than a single year.

Entry-level employees with computer skills will help to enhance the effectiveness of the new dependence on the computer for business. They will have been introduced to computers at a very early age, never having known what the world was like without them. Computer skills learned in the classroom will have reinforced the video-game generation's experience. This new generation in the work force will find the computers on their desks very familiar.

2

*By the End of the Century,
at Least as Many Computers as TV
Sets Will Operate in the Home.*



Several years ago, I was rather skeptical of predictions of the computer's widespread use in the home in the near future. Now, however, I find myself astounded by the rapid acceptance of the microcomputer for such uses as recordkeeping, word processing, education, housekeeping, personal finances, and entertainment. I predict that by the end of this century, computers in the home

will equal or outnumber television sets. In fact, each television and telephone openly invites the owner to attach a computer. Or perhaps the TV and/or the phone will actually encompass the computer. New software will make many more applications possible, sweeping the home computer market as dramatically as *VisiCalc* captured the professional market several years ago.

A clue to the force that will drive the home computer market is the banking industry's determination that banking at home electronically is an economically sound approach to controlling banking expenses. Banking via personal computer will alone anchor the computer solidly in the home. Videotex services and educational software targeted at the family will make the home market even stronger.

3

Computer-Based Word Processing Will Be the Means for Recording and Transmitting the Written Word.



First the alphabet, then paper, the printing press, and the typewriter made the written word easier to disseminate. Now electronic processing of words does the job for today's communications. If not already the established leader in computer uses, written communications will become the most popular application for computers.

No single word processing applications program will serve the needs of the entire market. The requirements of student, secretary, information worker, manager, and professional writer will encourage development of many different types of word processing systems—simple line editors,

memo writers, manuscript developers, engineering documentation systems, and record-keeping facilities. Many alternative software and hardware combinations will be designed to support the needs of this broad spectrum of users. This technology should in turn promote improved communication skills. Spelling checkers, syntax analyzers, automatic indexing systems, and thesaurus support will be widely available. Imagine the fast progression grade-school students will be able to make using these kinds of learning aids and the time businesspeople will save by having the personal computer handle grammar and style while they concentrate solely on

composing correspondence, planning strategy, and so forth.

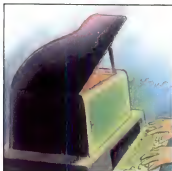
Suppliers of word processing products will proliferate to meet the incredibly expanding needs of a marketplace that encompasses office, home, and school. Word processing's effect on the handling of words will be similar to that of the pocket calculator on the handling of numbers.

Capturing text electronically is just a small step away from transmitting it electronically. New forms of electronic mail will ultimately replace many of the ways people presently communicate with each other.



4

The Personal Computer Will Be a Paradigm of Performance, Leading the Way to Increased Productivity.



To increase their levels of productivity, individuals must be motivated.

Yet even when motivated, they still often find it difficult to judge their own behavior objectively. No absolute guidelines can tell them what and how to improve. They lack a paradigm of performance. The personal computer, however, has begun to supply one.

The small computer can be both a measuring device and an instrument of improvement. Though inanimate, it can establish a paradigm of performance for the individual. It guides the user, leading and setting the pace for handling specific tasks. The personal computer conducts a consistent, unthreatening dialogue with the user, helping to improve his or her performance without causing jealousy, resentment, or a diminished self-image.

Using the microcomputer, a worker responds faster; the computer sets the pace of execution via screen-generated prompts. The computer user develops more far-seeing, in-depth, and alternative strategies by following the step-by-step chain of operations set up by the computer's hierarchical menu structures and multiple processing paths. And the user's ability to consider and execute several processes at the same time is enhanced by the computer's multitasking features.

Substantial technological improvements enable the microcomputer to respond quickly to requests for multitasking operating systems and to create new user interface environments. These new

environments offer additional data processing facilities, including fast screen painting and response, full screen-editing operations, bit-mapped graphics, additional input devices ("mouse" and touch-activated devices, for example), screen system management via windows, and user environments with all these features as well as general-purpose functions and operations that improve user comprehension when dealing with many applications.

Recent advances in overall hardware performance have yielded empirical data that suggest that the performance of the terminal operator increases as the response time of an on-line data processing application decreases. In selected studies reported by IBM (see *The Economic Value of Rapid Response Time*, IBM Document GE 20-0752-0, November 1982), end-user performance is optimal when response time is decreased from the 2 seconds promoted in the seventies to as low as $\frac{1}{10}$ of a second. Several experiments cited in this report indicate that terminal operators can improve their productivity by as much as 100 percent when these changes in hardware

performance are in place.

Observations of individual performance with a spreadsheet program or word processing package confirm these findings. The end user can become a virtuoso at the keyboard, performing with remarkable gusto, paced by screens that move and flash with unusual speed. No wonder software is now being appraised as much for its screen performance as for its practical usefulness.

But response time is not the only consideration in improving the performance of the computer user. Multitasking or concurrent operations add another dimension. When the user can perform overlapping tasks, he or she is encouraged to accomplish more per unit of time than ever before.

Finally, new man/machine interfaces further accelerate ease and comfort of computer use, also improving user productivity. These creative interfaces include bit-mapped graphics, including icons and windows of the sort that adorn Apple's Lisa and VisiCorp's Visi On, as well as touch-sensitive color graphics, such as those in Interactive Images's Easel system.

Armed with such intellectual stimulants and analytical tools, computer users find that they can increasingly control and improve output. Inspired by success, they generally renew interest in the job, conceive and develop new approaches and solutions to old problems, and assume more responsibility.

5

Desktop Computers Will Lead to Overall Personal Productivity Increases of up to 20 Percent.



These benefits of the microcomputer wave will improve workers' overall personal productivity. Supported by a desktop system as a component of departmental computing, workers will increase their efficiency in handling conventional tasks such as organizing schedules, keeping calendars, writing memos, filing electronically, preparing for meetings, tracking events and projects, managing phone communications, and coordinating their efforts with those of other per-

sonnel. In addition, software developments will create new capabilities for individuals, leading to their even more effective performance or ability and readiness to assume more responsibility.

All these advantages will give them each an additional hour or two in the day. This additional time can lead either to a shorter work week or increased production, both in turn increasing productivity. Widespread use of computers in home and at the office, along with word processors,

spreadsheet analyzers, and record keepers, will thus improve individual productivity by as much as 20 percent.

Students, housekeepers, salaried employees, and independent business owners will all benefit from the savings of up to 2 hours a day. The 1-year value of this improvement, measured in relation to the economic value of the individual worker's output, approximately equals the cost of the computer system. In other words, the system can easily pay for itself in 1 year.

6

*People Will Communicate
More, and More Effectively, via
Computer Networking.*

Yes, the personal computer is having a profound impact on individuals' performance, but individuals don't work alone. Their relationship to organizations and to co-workers means that networking will grow more important—at the local level and on a remote basis. The local area network will be the key to intra- and interorganizational communicating via shared resource facilities as well as shared file capability. Electronic mail, file transfer, and data sharing will

link an electronic community of users shaped by the needs of "departmental" computing, rather than the more impersonal corporate or organizational MIS data-processing-type computing.

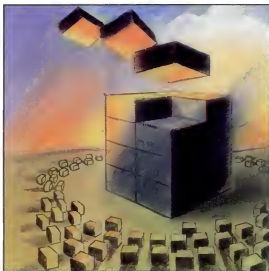
The personal computer on every desk will be as familiar and as oft used as the telephone—both allow people to communicate better, easier, and faster. They complement each other, the telephone offering voice and the computer adding memory and information storage. Their

combined facilities will merge and become a multifunctional workstation operating in a network environment.

Local area networking and wide area communications will connect people in new ways, letting them transfer data and share hardware and databases. Electronic mail will greatly improve communications, through its speed and ability to file, archive, and reduce inefficiencies automatically (a relief from today's "telephone tag").

7

*The Widespread Use of the
Personal Computer Will Encourage the Growth of the
Mainframe, Not Inhibit It.*



Some have already proclaimed the demise of the mainframe. In fact, many have dubbed mainframes present-day dinosaurs. But I predict that mainframes will increase in size, number, and performance—because of the personal computer, not in spite of it.

The surging microcomputer wave and the likelihood that the sales of personal computers will surpass those of mainframes will increase the need for host processors dramatically in the next 10 years. Two trends support this prediction. First, applications to exploit new opportunities for linking micros to mainframes to create distributed data processing environments will become more and more complex. Home banking alone will demand many of these links. Second, the need—and competition for—more and more information

will explode the data generation and distribution market (which is basically based on mainframes), offering formatted data and videotex products. Larger-scale computing will grow in demand in response to this need for more and better information.

Picture millions and millions of small computers on desks throughout corporate America. Much activity will be local, both in terms of processing and data needs, but a great need will emerge for access to other computing points, whether centralized mainframes in the corporate hierarchy, other personal computers, or publicly available utilities, as sources of data banks and auxiliary services. Individuals will want to connect with other computers to execute host-based applications, send or get a file to or from a mainframe, access

data from mainframe databases, use the mainframe as a back-end processor, send messages electronically, enter data for processing by the mainframe, and execute applications developed for distributed processing.

The potential impact of the microcomputer on mainframe computing needs is apparent when you look at the situation this way. First, accept the prediction that more than 30 million personal computers will occupy desks throughout the United States, and then assume that on the average each user will require connection to some host/mainframe 20 minutes a day over a peak 5-hour time frame. You'll see that with the average host supporting 100 personal computers at any time, 20,000 additional mainframes will be required to support this load.

8

*The Economics of Computer Hardware
Will Become More and More Like That
of the Automobile Market.*



The American automobile industry is a model for the future economic evolution of the computer hardware sector. Three factors are characteristic of this industry: mass production is the basis of economies of scale; standardization permits use of interchangeable parts and encourages the growth of ancillary, third-party suppliers; user interfaces are sufficiently alike that consumers are familiar with the use and requirements of various vendors' products.

Each automobile supplier is essentially selling the same product "under the

hood," the outer shell of the vehicle is what differs the most markedly from vehicle to vehicle. While most of the automobile's internal mechanisms, especially the engine, remain pretty much the same over time, the external appearance receives an annual "face lift" to satisfy or attract new consumers. Most people buy new models for their new looks and style rather than for any improvements in automotive technology.

Computer hardware vendors have now almost reached the point where these same factors will determine the personal com-

puter market. At \$5,000 to \$10,000 a unit, computer hardware will be viewed and merchandised in exactly the same way as the automobile in the next few years. People will replace their systems with newer models every 3 or 4 years. Just as a vast used-car market has developed, so too will a similar business grow for computer "re-treads." Indeed, the Model T of the computer world is the already "old-fashioned" 8-bit CPU. And today's "standard six" is the 16-bit machine, with the 32-bit model fast becoming the "standard eight."

9

Standardization of Software Is Becoming the Dominant Influence on Data Processing.

Just as hardware is reaching a level of standardization, software is also becoming more uniform, but much more slowly. The general environment for software users, specific functional areas (spreadsheet, word processing, and database), and data formatting are all virgin territory for standardization. The economics of the software market are not yet strong enough to force the kind of progress the hardware market has seen. And no clear leader in software has emerged to compare with the influence and the power of IBM in hardware.

However, it's only a matter of time before the underlying pressures for standards force a change. Take user environment. Why should users be confronted with differences that are purely a question of arbitrary choice in language? Since commands like COPY and PIP are intrinsically the same, the software industry should either accept them as interchangeable terminologies or select one as the standard designation. Help, Escape, Return, and Master Menu should all designate standard requests in every product, and in all cases you should be able to select them by using the same method. Actually, screen presentation, cursor movement, and selection of options are becoming increasingly similar.

As far as applications are concerned, much has already been standardized. The standardization of commands and operations among competing word processing systems, for instance, is astounding. They all have Insert, Delete, Search, and Print, and these common functions are used most of the time. With mature, well-understood applications, probably 20 percent of the functions and features serve the user 80 percent of the time. Even more



astounding, users can generally handle 80 percent of the jobs to 100 percent satisfaction with these basic functions and features.

The most important standardization yet to be attained will affect data formatting and communications. When these are more uniform, computing will go beyond supporting the user infrastructure and contribute to more efficient software production. Such software standards will parallel those of any mature industry, as with standards for phonograph records, cassette tapes, and film cartridges to accommodate the design of the various hardware devices that require them.

Some data-formatting standards are already common throughout the industry, including ASCII files, the simplest and most common denominator of likely file content and format, limited to "text" or what are often called print files; MS-DOS files, nearly a standard owing to the current dominance of the Microsoft operating system, MS-DOS (adopting this "standard" presupposes that you also accept consistency with the associated file directory system); SYLK (SYmbolic Link) files, a standard promulgated by Microsoft

that encompasses file formats that mix data and formulas, designed to make a highly encoded or binary file readable (the genesis of this attempt at standardization was the well-known *MultiPlan*); and DIF (data interchange format) files, the actual standard of file representation, with objectives similar to those of SYLK and advocated by Personal Arts Inc. and adopted by a number of vendors, solely because of the popularity of *VisiCalc*. In addition to these efforts to standardize file formatting, other activities focused on the goal of achieving commonality in file communication protocol. One of these efforts, introduced by Microcom, produced Microcom Networking Protocol (MNP). With MNP, error-free transfer of files from one computer node to another is possible within the framework of the International Standards Organization's reference model of open systems interconnection.

Only a beginning, these efforts may not be sufficient for the long run, when more sophisticated formats and structures will be required, especially for mainframe computing. Already, vendors have moved in the direction of IBM's standard protocols, such as Systems Network Architecture for general communications, and other standardization schemes, such as Document Control Architecture for standardizing directives that control document format and Document Interchange Architecture for interchanging protocols (specifications for transmitting and receiving documents).

In a few more years, such formatting and communication standards will be more prevalent. Both the industry and the users will demand them increasingly, giving impetus to even more standardization in the next decade.

10

*Software Will
Be Expendable.*

With the advent of mass purchasing of personal computers, software became a consumer product. A variety of retail distribution outlets opened to transact business selling software, prompting *Business Week's* cover story on the phenomenon in its February 27, 1984, issue. And the trend has really just begun; in fact, software products are fast becoming expendable consumer goods.

In accounting, expendable goods are purchased items expensed on a current basis. Typically, good accounting practice defines the expendable item as one whose value to an organization endures less than 1 year, or whose cost is less than some reasonably agreed-on amount. Items totally expensed within a relatively short accounting period are not considered assets worthy of being recorded on a com-

pany's yearly balance sheet and subsequently depreciated.

Software seems to be heading in this direction. I predict that it will become a low-cost, replaceable item for a number of reasons. First, the price of a software unit is already relatively low—in the \$250 to \$500 range. And large organizations will buy software in large quantities, at discounts of 30 to 50 percent. Second, software is revised within surprisingly short intervals; often less than a year elapses between revisions. These new versions are usually available to existing users for a modest replacement fee. Often, new revisions replace earlier versions entirely. Third, new, competitive products catch the interest of the consumer, making previously available items seem obsolete. And as data- and file-formatting standards become more prevalent, replacing old

software with new software will become relatively easy. Fourth and last, buyers can often justify purchasing software on the basis of a single project and therefore write the cost off over the lifetime of such an activity. This is clearly the case, for example, with a \$250 spreadsheet program used to produce and analyze dozens of comparative financial models for a single corporate acquisition study. The fact that the spreadsheet package may be used to analyze other acquisitions does not alter the intent of the initial purchase.

People will therefore accumulate software the same way as they do books, magazines, and other collectible items. Users will take programs off their shelves from time to time as they need them. The rest of the time many of them will accumulate dust as they line the walls decoratively, like so many books on the shelf.

11

The Applications "Backlog" Will Disappear.

During the past decade, industry reports on the growing applications backlog plaguing computer users in large organizations have alarmed many businesspeople. Popular belief maintains that large organizations currently have software backlogs of more than 30 months; in other words, at any point in time the existing software development staff could be kept busy for 30 calendar months handling only those tasks already identified and targeted for completion.

Some statistics have also pointed to a so-called hidden backlog, no less in size than the expressed demands. This hidden backlog reflects user needs that are not even submitted to MIS departments because users believe that they would

arouse little interest or no response. Users generally abandon requests for support when they feel that the best outcome expected would only solve tomorrow's problem with yesterday's specifications.

Soon users will break their dependency on the professional MIS staff. The personal computer will increasingly give them new tools and solution-oriented software so that even those without much training will be able to solve their own problems, and do so on a current basis. What will happen is that needs for computer assistance will be one of two kinds: those which are organizational, requiring complex, integrated applications performed by centralized, professional data processing personnel, and those which are individual

and based more on demand and geared to a particular result, readily handled in the software environment of the personal computer and by the relatively untrained user. When this breakdown of needs into those which are organizational and those which are individual is a fact of business life, the 80/20 rule will apply. Then 80 percent of the tasks required will be accomplished via personal computing, leaving 20 percent to be handled by centralized data processing departments.

More than eliminating backlogs, this change will make computing more democratic. For the first time responsibility for solving problems and the tools for solving them will both be in the hands of those who count most—the end users.



12

Computing Will Be Done in Two Tiers.



The computing environment is rapidly moving into a two-tiered structure with the user at one end and some form of centralized processing at the other. Under this structure, intelligent processing nodes located with individual information workers, professionals, support personnel, and production workers

will be connected to central processors and public utilities. This is a departure from earlier structures typified by dumb terminals connected in an on-line or time-sharing mode to a host processor.

Once, it looked as if three levels of computing might emerge. In that case, the middle element, often represented by the

minicomputer, would have reflected divisional or departmental computing. But it is now clear that such an intermediate level is neither necessary nor economically justifiable. In the future, departmental computing will be handled by linking personal computer nodes into local area networks, with shared resources and databases.

13

*Application Generators Will
Become Less Important.*

Application generators are typically software systems that create directives to dictate the logic of input, processing, and output comprising a specific application quicker and easier than individual software programs. Often, application generators are designed to give end users powerful means with which to

specify and generate custom-oriented applications. This purpose is antithetical to the dominant and growing trend to off-the-shelf, reasonably priced solutions for an endless variety of applications.

Who really needs an expensive application generator if the solution is only a few hundred dollars away via a software pro-

gram? Perhaps the need for these systems is limited to turnkey vendors who build applications; the end user certainly does not need application generators. Therefore, their market is relatively small, and demand will be modest. Eventually, they will become obsolete for the purposes of the end user.

14

*Executives Will
Use the Computer Keyboard
Enthusiastically.*

Assertions that executives will not use keyboards are excuses for failing to provide adequate support systems for decision makers. No evidence shows that top management will not use a personal computer. I predict that executives will be enthusiastic personal computer users.

New software will help executives improve their performance. This is a motivation for executives to use computers. Also, alternate input devices like pointing devices and touch-sensitive screens make personal computers easier to use.

Also, today's heirs to executive positions in corporate America already have

computer exposure. These executives recognize the value of the computer and will demand its constant aid. In the future, executives who ignore the power of the personal computer will be unable to compete in a business world moving at an accelerating rate. Management without the computer will be the exception.



15

*Voice Input Is the Sole
Remaining Untapped Innovation in Computing
(and the Most Promising One).*



With hearing, touch, and sight already incorporated into the most common computing systems today, the single dimension left to be exploited is sound. Since sound synthesis is already widely practiced, the remaining challenge facing developers is voice recognition.

Although modest capability for voice recognition already exists, vocabulary is limited. By the end of this decade, however, computers will be able to recognize more of the spoken word. Voice input will play a most important role in replacing the usual keyboarding and menu selection alternatives as well as providing a path for entirely new computer applications and markets. These new opportunities include adapting computers for environments

where keyboarding is not possible or is limited, and for use by the handicapped; using computers to respond to and coach new learners of an application as well as to redirect procedures of users who are making errors; eliminating intermediate work steps such as transcribing dictation or other writing tasks; and transforming every telephone into a full-fledged computer terminal for both input and output.

These dramatic changes all reveal the need for more megacomputing, looking at the world of computing with an eye to the future and what it will bring. To prepare for this new world—battered into a new configuration and given new vitality by the third wave, the microcomputer—strategists and planners must examine where the computing world is going and how it

will affect other aspects of the way modern men and women work and live.

In *Megatrends*, Naisbitt says that the wide availability and dissemination of information will be the "great equalizer" heralding a more egalitarian society. He predicts that "the computer will mask the pyramid" created by organizational hierarchies and information overloads. These 15 megacomputing trends will indeed affect personal productivity and extend the individual's activities as well as his or her control over wide responsibilities. And the microcomputer wave, essentially the personal computer, will be the means that will make these changes a reality in the next decade, creating a new world where people and computers work in new ways to shape the future. ■

*From Ray Bradbury to a theologian
to Bob Hope's personal comedy
writer, twelve opinion
makers look to the
future of computing.*

Other Voices, Other Futures

Predicting the impact of computers on society is becoming a popular national pastime, but the conservative optimism Werner Frank expressed in this issue's cover story is far from a unanimous opinion. We sent a copy of his manuscript to leaders in fields ranging from computer science to futurism to theology and asked them for their reactions to Frank's predictions.


A few of the leaders thought Frank overstated the future role of computers, but the majority felt he had played it too cool. In automation, they said, lie the seeds of revolution. They contended that at the very least, business practices will be so dramatically changed that it will be meaningless to say computers have increased productivity by a certain percentage—productivity itself will have to be redefined. And at the most, computers will lead us to the biggest social upheaval in 400 years—a change that will ultimately reach planetary, perhaps cosmic proportions.

Here are the various predictions of our twelve commentators.



"I want pedal input devices. If I'm really cooking creatively, I want to input like a one-man band or a Wurlitzer organ player."

—STEWART BRAND

 **J.F. COATES,**
President of J.F. Coates, Inc.,
Policy research firm
specializing in the study of
the future, Washington, D.C.

"I would make a much stronger statement than Frank has. There is only one universal elixir in American business and industry, only one medicine you can apply with absolute assurance that you can achieve a significant improvement in productivity, and that's the computer. I think his prediction of a 20 percent improvement is too small, but more importantly, he doesn't seem to realize that the very nature of work will change. And so talk about percentage improvements in productivity becomes meaningless. The change will be partially quantitative, but mostly qualitative.

"But I doubt word processing will become the universal medium of recording and transmitting the written word, any more than the typewriter wiped out handwriting. It may become the predominant method, but the transition will be slow, because some ways of doing things are worth keeping. I mean, who can imagine a word-processed love letter?

"Frank's conclusion that the applications backlog will disappear is interesting but somewhat questionable, because the other side is that as the capabilities for processing increase, there will be more and more things to process. What he is predicting is like saying that once you've got printing presses, everything that there is to print will be printed, but it doesn't work that way. The truth is, once you've got the printing press, people start thinking up more and more things to say and print.

"One thing he doesn't mention is the

new graphics capabilities of computers, which I think will change our way of thinking and become very widespread.

"Regarding his point that executives will enthusiastically employ the keyboard, well, it just ain't so. The most recent research shows that the great majority of executives still write with a pencil. It's going to be a great problem getting anyone over 40 to use the keyboard, because it is an intrinsic threat to their work structures and their egos. They feel the keyboard separates 'real people' from secretaries and won't put up with the ego shock of keyboards."

 **STEWART BRAND,**
Editor, *Whole Earth Catalogs*,
Whole Earth Software Catalog,
Sausalito, California

"In a sense, it's already true that there are more computers in the home than TV sets, if you consider specialized computers like pocket calculators, digital watches, devices in cars, and so forth. One of the great mysteries is whether the specialized types like these will eventually win out over the more general kinds.

"Word processing won't replace pencils; nothing ever replaces anything. It's an overstatement to say it will. In terms of people's having to write novels or poetry on a word processor, it's just not likely.

"As for executives enthusiastically employing the keyboard, well, it's a rather interesting notion that the older generation that was afraid of keyboards is starting to die off and the younger bunch that has been rewarded for using keyboards is going to take their place. So I think that prediction is probably accurate.

"The other question is whether keyboards are going to remain the major means of input. Frank mentions voice input, but there are others, like eye movement. Or take my feet, they're just sitting there like dead sticks under the table. I want pedals. If I'm really cooking creatively, I want to be able to input like a one-man band, or a Wurlitzer organ player. I want to pull out the stops and blast my feet around and lean some muscle into something.

"In the future the big thing will be telecommunications, with huge computers in orbit that have large arrays of antennas so that relatively small stuff, things that sit on your desk, can hook you into a planetary nervous system. That way when you enter the world of computers, you will be involved more with the planet as a whole. I think that is to the greater good."

 **JOHN HAUGHT,**
Professor of Theology,
Georgetown University,
Washington, D.C.

"I'm not qualified to talk about computers technically, but I can look at the emergence of this new technology from a cosmic perspective, as it were.

"The preparation of a suitable subsidiary base is physiologically necessary for the emergence of anything new. For example, before life could come about, the physiological basis of life had to become very complex and intricate, as molecular biology has pointed out. And before sentience could come about—for example, in plants and the lower animals—the physiological basis had to become extremely complex. And then, before consciousness


could emerge, the subsidiary base, especially the construction of the brain cells and the brain, had to become enormously and staggeringly complex for the 'leap' into the novelty of consciousness to take place.

"Well, what [Pierre] Teilhard de Chardin [French Jesuit priest and mystic] would see in this if he were alive today is that the spread of cables, satellites, and computer networks over the face of the earth is comparable in a way to the 'complexification' of the primate nervous system as the condition for the birth of thought. Now the complexification is taking on a planetary dimension. So the whole planet is being prepared by technology for the eventual birth of a far higher form of consciousness. Just as the brain fibers allowed the brain to communicate as one, so the information technology that is springing up on earth and linking us together into a planetary consciousness is continuous with the whole evolutionary process.

"What form will this higher planetary consciousness take? Teilhard was a religious man, and he would say the complexification of the planet is part and parcel of the growth of the Body of Christ, the Cosmic Christ. So we are building the earth to eventually encounter God in a deeper way than we have in the past.

"The implication of this cosmic perspective is that it gives a meaning and significance to people who work in the information field that transcends what they are usually aware of. There is something going on over their heads in this whole information explosion. So when people in the computer field want to know, 'What is the meaning of this work? Why, ultimately, are we doing this?' the ultimate answer

is that they are participating in a magnificent process of bringing about a physiological base for a higher and dramatically novel form of consciousness."

 **THOMAS BILLADEAU,**
President,
Office Systems Consulting Group,
Cambridge, Massachusetts

"By the early 1990s there will *not* be a computer on almost every desktop in corporate America. I think Frank bases his

"The whole earth is being prepared by technology for the eventual birth of a far higher form of consciousness."

—JOHN HAUGHT


prediction on the past growth record. But I think that around 1986 we will start fighting the battle of the 16-bit versus the 32-bit model. That is going to slow purchases down; the conservatives will stop buying and wait to see the result.

"Also, when we do get to the time when a computer *is* on everybody's desk, it will not necessarily be the computer that people see on their desks today. I think what you will see are what I call augmented telephones—'smart terminals.'

"If we use computers to evaluate human performance as he suggests, we will create a lot of Type A personalities.

But I don't think that anyone who runs a company and has any management skills at all is really considering using the computer as a spying tool. We've spent the last 10 years trying to convince people that computers are their slaves, not the other way around. If we begin to tell people that they may become slaves to the computers, we may be doing a grave disservice to the computer industry and the business world in general. It's a foolish line of thinking.

"I could not agree more that executives will enthusiastically employ the keyboard. I have always said that we have a great many closet typists in the world, and also that anyone who graduated from business school after 1975 is quite capable of using a keyboard. So we just have to wait for the pre-1975 graduates to retire or die. No matter what anybody says about touch screens, mice, and so forth, the keyboard will be the default interface for the foreseeable future, with voice input augmenting but not replacing it."

 **JEFF DUNTEMANN,**
Senior Programmer-Analyst,
Xerox Corporation,
Rochester, New York

"Frank really doesn't look ahead. This is great stuff for 1987 or 1988, but if we're looking toward the end of the century, we almost literally don't know what's going to happen.

"But I would guess the home computer will first grow out of the wall as an appendage to the telephone, rather than a device that is first and foremost a computer that is placed in the home. Until there is a highly integrated 'hang-on-the-wall' telephone/computer that has natural language

"Whether it will be for good or ill depends on how computers are used. Machines on their own don't go awry, people do."

—RAY BRADBURY


query-response capability and voice recognition and synthesis, nobody is going to use computers except hobbyists who enjoy computing for its own sake. It must be possible for a housewife to literally yell across the kitchen, 'How many eggs in that recipe again?' and have the computer reply in a synthesized voice, 'Three eggs.' Such a machine is at least an order of magnitude beyond what is now available, but we must have that level of sophistication or nobody's going to use it. Until the computer essentially fades into the background of the overall system of household appliances, it's not going to be used. I think he ignores that.

"The other thing that's needed is the notebook computer. It would be something the size of a TRS-100 computer that splits in half, where half of it is a full-sized LCD display, and the other half is a full-sized keyboard. It would need about 2 megabytes of RAM, bubble memory, and so forth. This product should be produced by 1992 or so. With a lug-around computer that takes up no more space than a book but gives you all the capability of an Apple Lisa or a Xerox Star Station, you'll see a big difference. This notebook-computer could be plugged into the home telephone/computer; you could get just about any information you needed that way.

"I take issue with Frank's flat contention that computers will lead to increased job satisfaction. Already we are seeing the emergence of electronic sweatshops, where people are measured very rigidly on their correct keystrokes per hour and things like that. How we use computers will dictate whether job satisfaction will increase. The other thing is, there are many different kinds of human activity. The computer will stimulate workers

doing creative work like writing, analysis, and planning. Where the computer may become oppressive is in what amounts to computer assembly-line work, where all you are doing is keying in information. So it's a question of application.

"And I disagree with him when he says computers will be able to measure performance accurately and objectively. That is simply not true. A computer can't measure the quality of creative output; that judgment is always subjective. If we do ever allow computers to evaluate human beings, we will deserve whatever we get, and it won't be good."


 **RAY BRADBURY,**
*Science Fiction Writer,
Author of The Martian Chronicles
and The Illustrated Man,
Los Angeles, California*

"I see nothing but good coming from computers. When they first appeared on the scene, people were saying, 'Oh my God, I'm so afraid.' I hate people like that—I call them the neo-Luddites. They're just like the people who used to run into factories and beat up on machines with sticks. They say, 'The computer will know everything about you.' My response is, so what? I've got nothing to hide.

"I think in education alone we're going to see some astonishing jumps forward with dumbbells like myself who didn't learn algebra in school. Maybe a computer can help me finally to learn it.

"I think computers will soon begin to proliferate like crazy. After all, in a sense they are simply books. Books are all over the place, and computers will be too. It's inevitable.

"Whether it will be for good or ill depends on how we use computers. You can drive a car carefully to get home, or you can use it to run over people. Machines on their own don't go awry; people do. If people get better, the machines inevitably get better along with them."


 **WILLIS HARMON,**
*President of The
Institute of Noetic Sciences
in Sausalito, California,
and Author of An Incomplete Guide to
the Future*

"I don't see any reason to question Frank's projections for the short term; but the point is, basic values and attitudes in the world are changing. The whole system is changing, and you've got to embed these questions about computers in this system change.

"So where is the world going? I see some major change-forces coming, for example, the attitudes that are represented in the women's movement, the Third World movement, and the peace movement. Those are not kid's movements; they are made up of adults who are insisting on a change of social values. The power of the movements will be huge.

"And computers will be a big part of it, because computers are personal empowering tools. In computers we now have a technology that, rather than empowering large organizations over persons, instead empowers persons. We will see a much more widespread sharing of power. We went through a temporary period since World War II where it became sophisticated, smart, to behave as though the financial bottom line was what really counted.

But it isn't. It won't hold a society together, and we are already in the period of discovering that. People are insisting on an organizational structure based on values that come from very deep within themselves. It's the most fundamental change since the Reformation and the Copernican revolution, no doubt about it. Because it is so fundamental and 'whole system,' you can't take any piece of it and project ahead very meaningfully. But the computer is very definitely an element in this discovery."

 **MARK CHARTRAND,**
Freelance Science Writer,
Alexandria, Virginia,
Former Chairman of Hayden
Planetarium in New York City,
Former Executive Director of The
National Space Institute

"I don't think there will be a computer on every desktop in corporate America. I don't see the very highest people in the big industries having computers on their desks. These people do not generally deal with concrete facts, but with concepts, policies, strategies. And so far I don't see any software that will enable them to get data from a computer equal in quality to that which can be gathered and presented by the brain of a subordinate.

"The home computer probably won't be called a home computer; it will be something like a 'family information center.' You will see TV, music, data of all kinds coming through it. In 15 or 20 years you may have a data bus in your wall, just like now you have an electrical bus into which you plug your radio, shaver, or whatever. You could plug a terminal into

the data bus in one room and a hi-fi speaker in another room—things like that.

"What we are going to see is lots of smart machines. They're already here, really. The microwave-oven timer, electronic ignition, the calculator, automatic TV fine-tuning—all are computers, even though we don't call them that. So I'm not sure something called a computer is the wave of the future—the smart machine is.

"Saying that mainframe demand will increase does not take into account possible big advances in data storage technology. I think in 20 years you'll be able to put the Library of Congress in a cubic inch.


"In 20 years you'll be able to put the Library of Congress in a cubic inch. Ordering and accessing the data will be a problem, though."

—MARK CHARTRAND

Ordering and accessing that data will be a problem, though. Information organization and retrieval technology will have to advance to address that issue.

"I think the big innovation coming is portability. At home and at work, you'll sort of plug your briefcase into your desk or use a satellite link. For example, there's a plan for a locating system called Geo-Star. You put a bunch of satellites around the earth so that anybody could hook up with them using a unit the size of a TRS-100. Then you link them with a network of Cray 1-S computers, and they can triangulate

late on you—give you your position on the earth to within several decimal places. That's the first step. The second step is adding a telephone link, which would give you, essentially, your Dick Tracy wrist radio. I think people are going to look back at 1984 and say, 'How did we ever get along without that?'"

 **PETER NORTON,**
Author of *The Norton Utilities*
software set and various books
including *Inside the IBM PC*,
Santa Monica, California

"Basically, I think Frank is on the mark. It's an unkind and unfair way of putting it, but it's almost as if he is saying platitudes. But that's a way of saying yes, he's right, it's a sensible distillation of what a lot of people are saying about what's going to happen in the micro world.

"I agree that an increase of 5 to 10 percent in productivity can be achieved with the personal computer, and I especially agree with the low number—that he's not saying, 'Gee, this is going to double productivity,' or any of that kind of wild stuff. It's incremental. Modest but worthwhile improvements have come through the use of PCs.

"But he's off-base when he says that the use of personal computers will remove the emotional land mines of the workplace, jealousy, resentment, and so on, and make things more rational. That's a load of bull hickey. It's nonsense to say that computers can better evaluate the quality of people's work than people can.

"I think he is really onto something when he says response time is increasingly

"Computers, as we use them, tend to increase the power and authority of large organizations and undermine representative democracy."

—DAVID BURNHAM

important. On the surface, you might not think there is a big difference between response times of two seconds and one-fourth of a second, but the point is that a two-second pause disrupts your work rhythm and your thinking; so it's an important factor. For example, now I'm using an AT, and I've found that I'm getting a lot more done because I'm not being disrupted by waiting for the machine."

 **HARVEY BERGER,**
Comedy Writer for
Bob Hope and George Burns,
Los Angeles, California

"More and more, software is coming out that meets the specific needs for entertainment writing. There's *Scriptor*, a script-writing program, and I'm sure you will find other customized applications coming up all over the entertainment industry. It may not look like it, but the entertainment industry is very paper oriented, and scheduling, scripting, and so forth will be streamlined by computers."

"Telecommunications will be the big thing. If you are shooting on location and want to discuss a script change with the home office in Hollywood, you'll just hook up a modem and do it."

"It will be a tremendous thing for comedians. Bob Hope, who I've worked for, literally has a full-sized, walk-in bank vault, a real bank vault with the door and everything, that contains his joke file. They're all in file cabinets—we're talking thousands and thousands of files. So if he needs to do a routine on Gerald Ford, he can hunt up the Gerald Ford file. But it takes a tremendous amount of manpower to maintain this file and call up items. You

could put it all onto a hard disk, and it would be so much simpler."

"It will be interesting to see if artificial intelligence could ever yield a funny computer. I doubt it. Computers need logic, and humor is illogical. So I think comedy writers are safe for a while."

 **DAVID BURNHAM,**
New York Times
Communications
Reporter,
Washington, D.C., Bureau,
and Author of
The Rise of the Computer State

"The idea I lay out in the book is that computers, as we use them in this society, tend to increase the power and authority of large organizations and undermine representative democracy."

"As the personal computer is linked more and more with the big mainframe, we're going to have more storage of what I call transactional information. You'll order cable TV shows, do your banking, get a book from the library, and so forth. All this will create records, and as the law is written now, these records will have very little privacy protection. I think this information, which can be collected and used by large businesses, law enforcement agencies, and so on, is dangerous."

"I'm not a Luddite—computers are here. What we've got to do is pass restricting legislation, or else organizations like the National Security Agency and the Internal Revenue Service and the big credit reporting companies will be wielding so much power that they will really strangle individual initiative and representative democracy in general. Information is power,

and those who control it can control people who don't. I am afraid that we could become a regimented, cautious people and lose the freedom and spontaneity that made this country great."

 **JAMES FALLOWS,**
Washington, D.C.,
Occasional Computer Columnist for
Atlantic Monthly,
and Former Speechwriter for
President Jimmy Carter

"I think computers will become common on corporate desktops because they address the two basic tasks of business: writing and manipulating numbers. They'll be as common as the telephone."

"But it's hard to believe that in every part of the business world the sort of power that computing gives you will be directly more productive. If a policy analyst somewhere can get statistics faster, will that always lead to more productivity in any real sense? I'm not sure."

"I hope that executives will enthusiastically employ the keyboard, because one of the strange and stupid class divisions in the business world these days is this taboo against putting your hands on the keyboard if you are not a secretary."

"In all, computers will do to us what other significant technological revolutions have done to us: on the whole, they will make the society richer, but just as the industrial age brought significant localized harm, so will computers. The Industrial Revolution left society much better off, yet many skilled craftsmen found their jobs had become obsolete. Same with computers—mostly, they'll be a benefit, but for some people they won't be." ■



The Best of 1984

THE YEAR 1984 HAS come and gone, and with it have come a vast number of new entries in the micro-computing arena. Some of these software and hardware packages have set the micro world on fire, others have generated a few sparks, and a few fizzled out altogether.

The staff and writers of PC have looked back on the past year and have chosen 26 of what we consider to be the outstanding products of 1984. We have also placed our tongues firmly in our cheeks and picked out a few of the year's less notable features. What follows is our honest (if somewhat biased) views of the best and worst of 1984.



G. William Dauphinais and Paul Somerson— **IBM PC AT**

Many people will remember 1984 as the year computer users were given real hope of being able to attack the thousands of information processing problems that beg for an inexpensive multi-user PC solution. IBM's announcement of the PC AT combined with XENIX, a multi-user operating system that will run on the AT, is an important first step.

But the announcement is just a first step: Most of the multi-user products announced in 1984

turned out to be nothing but "multivapor," announced but never seen. Nonetheless, they allowed users to at least begin to work on small applications requiring multiterminal access to common data. The need for special applications of this type in accounting alone is endless. Think of them: branch office accounting, inventory

and
some
of the
Worst



control for a warehouse, and multi-register point-of-sale systems.

Local area networks haven't filled the bill. That technology is still evolving, and very little multi-user software "understands" what a given vendor's network hardware and software is doing with file sharing, file security, and so on. Furthermore, the proliferation of UNIX-based multi-user superminis has not provided the momentum, the standards, or the stability necessary to attract the broad-based software development that UNIX (XENIX) needs in order to become a viable force in the commercial market.

Only the AT/XENIX combination offers hope that in 1985, top-notch developers of multi-user software will have a place to focus their efforts. The entire computer community will benefit from the abundance of great software this combination should produce—just as it did when the PC and MS-DOS started to dominate their market.—G.W.D.

The best computer news this year or any other is the ineffable PC AT. This desk rocket makes every other micro I've used sputter loudly. They're really gonna have to

pry my fingers off this seductive, magical box before I give it up (unless IBM has come out with a speedier version, of course). The AT really flies; it's spoiled me so much that working on my lumbering XT has grown akin to slow torture.

There is no standard monitor for the AT, but you can't beat IBM's new Professional Graphics Controller and Display, whose lush output rivals that of color photos in *National Geographic*. The AT/Professional Graphics system, with my 350-cps Okidata 2410 workhorse attached, is computer heaven.—P.S.

G. William Dauphinais is partner in charge of Management Consulting Services at Price Waterhouse, Sacramento. Paul Somerson is executive editor for PC.

John Dickinson— Power Director

If you're like me, your PC and its peripherals tend to get spread about the office, leading to a messy tangle of wires, plugs, and switches. Not only that, switching things on and off is inconvenient, especially when your printer winds up 10 feet or so from your PC.

Computer Accessories Corporation's line of Power Directors fixes all that by providing a variety of basic electrical services to PC users. Their primary role is to provide a convenient central location for controlling power to your computer and peripheral equipment, but they do more than that—and they aren't even expensive.

A primary switch controls line current to the Power Director, and individual switches distribute the power to each of five connected devices. You

can leave individual switches on so the devices will be powered up

when the Power Director is switched on.

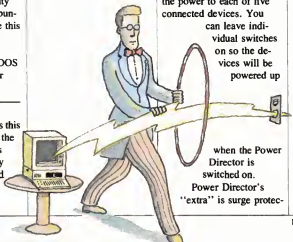
Power Director's "extra" is surge protec-

tion, which prevents electrical peaks and valleys from wreaking havoc on your computer's memory chips. The primary switch protects your equipment from line voltage surges, and each circuit includes its own surge protection to prevent any device from doing electrical damage to the others.

My Power Director controls the PC, a printer bench that includes two printers and an external buffer, the color display, modem, and an air conditioner. Did I say air conditioner? Yes—the Power Director's intercircuit surge protection works so well that my room air conditioner hums along, starting and stopping its compressor, with no effect on my computer equipment!

Power Directors are designed to fit ergonomically into a PC work area. The Model P2 fits neatly underneath a video display, and the larger Model P22 fits nicely on top of or under a PC. The P22's extra width contains a slot tailored to hold a Computer Accessories serial or parallel device switch or a Hayes Smart-modem. A smaller Model P22 is also available.

John Dickinson was the project manager for PC's special issue on printers (Volume 3, Number 23).





Peter Norton— Lattice C Compiler

I'm a big fan of the Lattice C compiler. Different programming languages serve different purposes: C is best for systems programming, where the primary needs are for tight code generation and total control by the programmer of what's going on. The Lattice C compiler is quite good in both respects, and in my opinion noticeably better than any of its competitors.

Lattice C generates code that is quite compact and fast-running; the closest competitor in my tests generated code that was about 10 to 15 percent bulkier. The most important requirement, though, for a C compiler, from my perspective, is that it allows the programmer to control what's going on in the programming environment. Lattice C meets this need by providing source code for the program prolog (or entry code), which helps any programmer expert enough to tinker with the entry code. Lattice C also

lets the programmer freely choose between creating COM or EXE program files.

All these benefits come with any version of Lattice C, such as the one sold under Microsoft's name. The most recent versions, sold under Lattice's own name, offer a choice of four




memory models—a key factor for some programming jobs.

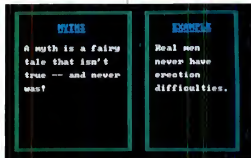
Finally, it's important to note that IBM has given Lattice C semiofficial status, adding it as the only C compiler in the list of supported languages for some new IBM products.

Peter Norton is the author of The Norton Chronicles column in PC.

The Bob Guccione Award For Soft-Core Software

 Psycomp Software came out with what must be the pseudopsychological winner of the year—dynamic software entitled *Coping with Stress, Handling Depressed Feelings*, and—get this—*Treating*

war. For example, *Treating Erection Problems* gives users multiple choice questions like, "I have erections (a) often (b) sometimes, and (c) rarely." (The word "never" must not be in Psycomp's vocabulary.) The



Erection Problems.

These software versions of "Dear Abby" purport to provide troubled users with an electronic analyst ready, able, and willing to take on their emotional hang-ups without inconveniencing them with an hourly fee. After all, in an age when grave problems are solved within 60 minutes (and that's including commercials), a microcomputer monitor makes a suitable psychiatrist.

Psycomp approaches serious problems in a way that would trivialize a nuclear

program then gaily announces that the user isn't really impotent at all, is he. You see how easily these little problems can be solved?

We should not be too hard on Psycomp, however. The manual for *Treating Erection Problems* is enough to perk up any editorial office—it features extremely explicit photographs to illustrate exactly how one couple solved that particular problem.



Illustration: Kurt Vignea

Frank J. Derfler, Jr.—**Infoscope**

I admit to being jaded. Much of the software I receive for review endures loud verbal abuse that never reaches print. But I was respectfully silent when I first ran *Infoscope*.

The *Infoscope* data management program has many of the attributes of a traditional database manager, but it was designed with a different philosophy than that behind typical products. *Infoscope* is the first of what I see as a wave of heuristic software—it learns to work the way you do. *Infoscope* literally watches your keystrokes and adapts to you and your work.

I wouldn't have a "favorite" program that doesn't make good use of the screen. *Infoscope* uses color, flashing lines, and other graphic features to help you form multiple windows in which you enter and examine the information you want the program to handle.

As you form the windows and work with the data, *Infoscope* monitors what you do and adjusts itself accordingly. If you need a wider field, keep typing and the program adapts. If you don't like a command word, the program instantly learns a new word that invokes the same response. It notes what colors you like and tries to please you. The program can even talk to you if you

have an appropriate speech synthesizer hooked up to your PC.

The care and detail that went into *Infoscope*'s planning and construction make it my favorite program of the year.

Frank J. Derfler, Jr., is a contributing editor for PC.

Alfred Poor—**H-P LaserJet**

I have no hesitation in proclaiming the Hewlett-Packard LaserJet printer as the best new product of 1984. The LaserJet is not only a tremendous product in its own right, but it also bodes well for computer users as a representative of a new breed of printers.

I am not a hardware freak; I am much more likely to get excited about a clever database or a flexible communications program than about a piece of equipment. But it's hard not to get excited about the LaserJet, no matter what you're interested in.

What would you say about a dot matrix printer that has 300 dots-per-inch resolution (both vertically and horizontally), that produces type so clear that it almost looks typeset, that prints at a rate of 8 pages per minute (that's more

than 500 lines), and does all this at less than 55 decibels when it's going full speed? Sounds remarkable, doesn't it? The LaserJet prints on cut-sheet pages, both letterhead and legal size, and it can handle envelopes too. A wide range of fonts on ROM cartridges is available.

Perhaps the biggest miracle is that this machine lists for just \$3,500. That's the cost of a good daisy-wheel or Spinwriter with a cut-sheet feeder, yet the LaserJet is faster, quieter, more versatile, and, in some ways, produces better results.

Another reason the LaserJet is so important is that we can expect to see similar machines appearing soon. The LaserJet is based on the Canon laser "print



engine," which takes after Canon's Personal Copier mechanism. Corona has already announced its printer using the Canon works. As a result, expect to see a



drop in prices and more features as a result of swift competition and rapidly growing production volumes.

1985 should be a very good year to buy a really hot printer and, with any luck, at a great price.

Alfred Poor has contributed frequently to PC Magazine.

Vincent Puglia— Watson

My favorite of 1984 is a new product that makes running a small business relatively hassle-free. Watson is not watching anyone, nor is it a company founder, but it's likely to open a new arena in PC applications.

Essentially, Watson manipulates voice and data information in an integrated system that, among other things, replaces many of the appliances usually associated with the telephone. Its hardware includes a 300- or 1200-baud intelligent modem and a Texas Instruments TMS320 coprocessor. Its software is capable of telecommunications, voice-annotated data files, context switching, and concurrency.

One of the system's nicer features is that it is not limited to computer users; anyone with a TouchTone phone can access it. What I love about this product is

its ability to automate many of the tasks I would normally have to do personally, such as waiting for one of PC's editors to call. With Watson, I could leave the editor a personalized voice message rather than the answering machine's standard "I am not in . . . at the beep" message. In turn, she can berate me all she wants, hang up, feel guilty, call back, and edit her remarks.

Because it incorporates a communications program, Watson includes a phone directory, autodial and log-on features, and PC-TALK III. It also has a database, appointment scheduler with tickler files, and time-billing system. You do context-switching with a simple toggle, and the TMS320 processor can be answering the phone while your PC's 8088 is running application programs.

Watson may not replace receptionists and secretaries in the long run, but for people who cannot afford to hire someone to answer the phone, it does make life much easier.

Vincent Puglia is a frequent contributor to PC.

The Ebenezer Scrooge Award For Personalized Peripherals



Christmas is such an inefficient holiday. There are all those relatives, friends, and neighbors who expect you to write—actually write—individual holiday cards to each and every one. How old-fashioned!

Well, Mimi di Cie is only too willing to help you with this irritating problem. That company has come up with Christmas Computer Forms, just the thing for creating that really personal holiday message. All you have to do is whip up a nice, neutral Christmas greeting, stick your address file in mailmerge, turn on your printer, and watch the true meaning of Christmas

appear in dot matrix. The stationery even comes with a wreath of holly printed around the edges, for that extra touch of festivity.

It stands to reason that such a quality item demands a quality price. The James Company's mail-order catalog offers 100 sheets of the watermarked bond paper (along with 100 pretty red envelopes) for \$35. Of course, you can normally buy a carton (about 3,500 sheets) of fanfold cartridge-fed paper for about \$30, but then, Christmas is the season for giving, isn't it?

NOW, YOUR ORDER
HAS WINGS!

Receive your package
in 48 hours...use our
new Pilot Courier
Service. Phone toll-free, charge
it, and it's there before you
know it, super convenience when
you're in a hurry.

Most products may be sent via
Pilot...details on the
envelope in the centerfold.
Normal delivery is speedy too—
ten to fourteen days, usually.

Fast shipment, good products,
price proven for 29
years to shop





Will Fastie— **NUTSHELL**

When I evaluate a new software product, the thing I look for first, and consider most important, is the human factor, that is, how the program interacts with the user.

NUTSHELL, a flat-file information manager, excels in this department, going far beyond being simple to learn and use. Most evident is the visual approach the designers have taken. Less obvious at first

makes for easy guesswork—almost any keystroke that you think will have a certain effect will, indeed, have that effect. A good example is the command menus, in which the user can select an option with the Tab key, the space bar, the cursor control keys, the command's first letter, or an Alt-key combination. That should cover just about anyone's predisposition. And while it might seem confusing to think of a program with all those options, you'll quickly gravitate to the set that seems most natural and comfortable.

Although easy to learn and use, **NUTSHELL** is still a powerful information manager. Its ability to perform free-text retrievals is unparalleled. Because it incorporates many text processing features usually missing from data management systems, its report formatting capabilities are rich and unique. Finally, a forthcoming version will include multiple files.

Will Fastie is the editor of PC Tech Journal.

Craig Stinson— **Borland International**

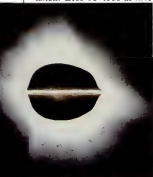
Borland International gets my vote for company of the year. Not just because it launched two extremely successful software products in 1984—Turbo Pascal and *Sidekick*—but because it demonstrated that a small company can still make a large dent in the PC marketplace.

Borland was founded in May 1983—over a garage, would you believe—by Philippe Kahn. Today, according to Kahn, the firm numbers 85 employees and does about \$1 million worth of business per month. As of mid-October, the company had shipped 170,000 Turbo Pascals and 50,000 *Sidekicks*. To date, Borland has taken on no venture financing.

Kahn achieved success by giving the market a good product at a sensible price. Turbo is a \$50 Pascal compiler that in most ways outperforms its expensive counterparts from IBM, NCI, and Microsoft. *Sidekick* is a \$50 calculator-notepad-autodialer (and more) that you can summon to the screen while running almost any other application program. And, Kahn says, there's more good stuff on the way.

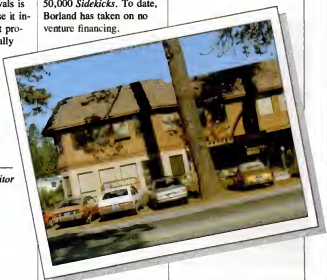
Borland International is located at 4113 Scotts Valley Dr., Scotts Valley, CA 95066. The phone number is (408) 834-4800.

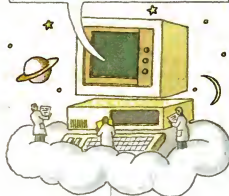
Craig Stinson is a contributing editor for PC.



is the progressive way in which you can operate the program—first with menus, then with shorthand menus, and finally with single keystrokes. **NUTSHELL** evolves naturally along with the user, with no confusion.

Most impressive, however, is that Nashoba Systems has managed to build an interface that almost anyone can use intuitively. A skillful blend of IBM, Wang, and PC conventions





Craig L. Stark— ASYST Scientific Software

Like Athena, certain computer programs seem to spring full-grown from the brow of Zeus and immediately take their place not only as the first, but as the ideal exemplars of their type. *dBASE II* was a classic in this sense almost from the moment of its introduction. Macmillan's *ASYST* should do for the working scientist and engineer what *dBASE II* did for database management. In a word, it lets the PC replace the minicomputer in data collection, analysis, and graphic presentation.

Even to list the built-in functions contained in the three *ASYST* Modules (I: System/Graphics/Statistics; II: Data Analysis; III: Data Acquisition) would require a substantial article. Macmillan supplies four very thick tutorial and reference

volumes as well as a disk of on-line help messages and another of demonstration material.

Even *ASYST*'s extremely powerful programming language, while not intended for the layman, is accessible not only to the post-graduate but also to the student in EE101 or Physics 12. *ASYST*'s well-designed functions take full advantage of the speed and precision of the 8087 coprocessor and can use the full 640K RAM you can stuff into a PC. Driver interfaces for popular A/D and D/A boards, terminals, and plotters are also provided.

Craig Stark is technical editor of PC.

The Phyllis Schlafly Award For Creative Software

Many of our female readers will recall owning, at one time or another, a Barbie doll. That epitome of American womanhood has convinced a majority of the under-10 set that adult women always walk on tiptoes. Remember how arduous and time consuming it was to dress, undress, and redress that little plastic figure? Not to mention the dollars you had to regularly wheedle out of Mommy and Daddy to provide Barbie with a decent wardrobe.

Well, labor-saving technology has done it again. Epyx, in collaboration with Mattel Toys, has come up with computerized *Barbie*, a software product that the company calls a toy "playable on the home computer screen." The pert blonde appears in the opening screen in a provocative little tuxedolike bathing suit and,

like the original, can be dressed, and undressed, and redressed . . . all by using a joystick, however. Children desirous of real intellectual stimulation can even make Barbie go shopping for more clothes in her sports-car.

However, why should little girls have all the fun? Little boys can play with Epyx's *G.I. Joe*, in which, according to the press release, "the child selects the battlefield activity in which he wants to interact." Just think of the fun your 6-year-old son can have selecting, say, an M-16 to waste the bad guys in glorious computerized color.

Of course, all this sex and violence is being offered strictly in the cause of education. A representative of Epyx stressed that, "building a child's imagination is not a game." Apparently not.





Jared Taylor— **Report Manager, Advanced Version**

The market is a cruel, whimsical place. As Lotus's 1-2-3 basks in glory and slick promotion, a clutch of other first-rate spreadsheets toil in its shadow. One of the best of the also-rans is *Report Manager, Advanced Version*.

Report Manager's great strength is its third dimension, which lets you stack similar spreadsheets on top

of one another as if they were sheets of paper (see "Report Manager, Not Just Another VisiClone," *PC*, Volume 2 Number 6). You can move from one year's projections to another with a single keystroke and split and rotate the "data cube" to build spreadsheets that display the same data in different ways. This 3D concept is an eye-opener for anyone stuck in the two dimensions of Lotusland.

This program offers almost every imaginable spreadsheet function and feature, including its own programming language called EXEC. EXEC lets you build self-executing, interactive models that will branch and loop according to your input.

Report Manager doesn't try to be all things to all people. Its authors haven't

encumbered it with a second-rate word processor or database. They've tried to build the best spreadsheet around—and have come close to doing so.

Jared Taylor is a contributing editor for PC.



Winn L. Rosch— **Xeno-Copy**

Personal computers existed before the PC plundered the market, and a number of foolhardy adventurers—such as yours truly—invested in them. If you were one of those pioneers, you'll inevitably find that, to keep up with the rest of the world, you must advance from CP/M to IBM. Suddenly, you're stuck with a pile of floppy disks filled with facts, figures, and fortunes that can no longer be used.

Disk incompatibility among 5¼-inch floppy disks still persists even among state-of-the-art com-

puters, and that's where *Xeno-Copy* comes in. Slide this program in your PC, and you can transfer text and data files from any of 70 (soon to be 100) different 5¼-inch floppy disk formats to IBM disks. (It can move programs, but most will not run on inhospitable computers.) *Xeno-Copy-Plus* lets you send files both ways—reading, writing, and even formatting any of the multiplicity of disk formats.

Finally, you can exchange files with friends and associates who own machines whose names you've never heard before (except if they should be Apple, Commodore, Franklin, or Atari).

Xeno-Copy is demanding, quirky, and copy protected, but it proved invaluable in transferring a book manuscript from one arcane disk format to the one my publisher could handle. It didn't quite save my life, but it did let me devote a good portion of my time to more rewarding pursuits.

Winn L. Rosch is a contributing editor for PC.

Corey Sandler— ProKey

Sometimes I think computer programmers would prefer that we mere users never touch their final products. I mean, why else would they go to such great lengths to make their otherwise useful applica-



tions programs so difficult for hapless mortals like us to use?

I'm sure you know the type of product I'm talking about—one that insists you type a Ctrl-QC key combination to get to the end of a file, or one that demands you use an F10 key instead of the Return key to enter data but innocently leaves this not inconsiderable vagary off its help screen. Perhaps you're familiar with a word processor that uses the Del Key to re-

move the character to the left of the cursor when you want it to take out the character at the cursor position. It's cruel and usual punishment.


And so, that is why I fell in love with *ProKey* when it first came on the market almost 2 years ago (a new version, 3.0, was released in 1984), and that is why I continue to use it and recommend it at every opportunity. The product is a declaration of independence for users of many PC-DOS-based software products. It gives the user the ability to redefine most of the keys on the PC board so that the software fits the user, rather than the other way around.

For example, I own the only copy in existence of a word processor that is called "WordStar by Micropro, as Fixed and Upgraded by Sandler with the Assistance of ProKey." It's all mine, and it works, and, although it doesn't brew my morning coffee, it stays out of my way when I am writing. What more could I want?

Now, I feel like launching a new campaign to demand *ProKey* compatibility as a requisite for new software offerings. If I can't have it my way, I don't think I want it at all.

Corey Sandler is a contributing editor for PC.

The Graceful Decline Award

 *WordStar* is the Joan Collins of the software set: It's old, it's beautiful, and it's a bitch. All this time, and it's still the one that all others are compared to.

You can sum up *WordStar*'s long majority in two words: Class tells. Old as it is, the faster-better-newer crowd hasn't been able to unseat the Dowager Queen.

"Hard to learn, easy to use" is everyone's favorite *WordStar* aphorism. It's not true. *WordStar* is easy to learn badly and hard to learn well. More than half of its users are mishandling it. No wonder it's tough on them. But watch out if you turn your back on it—hell hath no fury like the wrath of a *WordStar* scorned. It'll sneak Ctrl-QPs into your fingers and litter your documents with the graphic equivalents of Ctrl-E, -S, -D, and -X.



*Diane Burns and
S. Venit—*

CS-5 Solid Modeling System

In 1984, Cubicomp Corporation's CS-5 brought solid modeling capabilities to the PC for as little as \$10,000. A breakthrough in computer graphics, CS-5's relatively low cost makes it appealing to both ends of the graphics industry. Small design firms and architects who have been using standard pen-and-ruler methods can produce several design versions in a fraction of the time with CS-5 on a PC. Some large commercial graphics and animation houses are using CS-5 to produce animated video for television promotional material.

Fewer than ten short command lines caused an orange satellite to rotate towards us, growing larger as it moved from the top left corner of the screen to the lower right, then smaller as it moved away again. In the past, graphics like these could be created only

by modeling systems that ran on a mainframe or minicomputer and cost anywhere from \$50,000 to several million dollars.

With the help of Cubicomp's system, the IBM PC will be on the forefront of the new computer graphics revolution, when sophisticated technologies make complex graphics and modeling accessible to everyone. Large corporations, small, computer-savvy design firms, and the wildly growing video industry will benefit the most from the innovations offered by CS-5 at a price that more businesses than ever can afford.

Diane Burns and S. Venit are freelance writers in San Francisco who contribute regularly to PC.

M. David Stone— Fujitsu SP830

As a writer who has sat on the editor's side of the desk from time to time, I have never been willing to settle for anything less than a Selectric-quality printer. Still, I must admit to casting a wistful eye at the world of dot matrix, where printing speeds of 180 characters per second or better are not uncommon. Even the most inexpensive dot matrix printers can tool along at speeds that put my 39-cps Diablo 630 to shame.

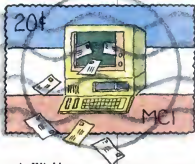
Then came PC's Project Printer, and I had the chance to play with the Fujitsu SP830 daisywheel

printer. Make no mistake—the SP830 has a double handful of good points, but the feature that caught my eye was speed. At 63.9 characters per second, it runs as fast as some low-cost dot matrix printers, and that makes it the fastest Selectric-quality printer by far.

Not so incidentally, the serial version of the SP830 uses Diablo 630 command codes, while the parallel version uses Qume Sprint 11 command codes. Either way, most software will know how to control the printer.

M. David Stone is the author of Getting On-Line.





Connie Winkler— MCI Mail

"Your mailbox has 4 messages."

Wow! I get a little charge every time I see a message like that. It's the same euphoria I used to feel on opening the mailbox and finding a personal, handwritten letter—a thrill that's been deadened with the onslaught of junk mail and the supremacy of the telephone.

That I have messages waiting in the system more often than not is MCI Mail's most attractive feature: I love MCI Mail because I feel loved when I use it. Indeed, I could have as many as 150,000 pen pals, because that's how many MCI Mail subscribers there are. (Please don't all write at once.) MCI Mail, which took off in 1984, has garnered enough subscribers to make a relevant universe—at least for me. MCI Mail thoughtfully provides some personal touches: the ID number is my name, and the password that I use has an

easy-to-remember lilt to it.

I must confess, however, that much as I love MCI Mail, I also hate it: Once the ID and password are entered, following the commands (in either Basic or Advanced) occasionally leads to endless logic loops. Programs and even menus must have been written by overzealous technicians, leaving nontechnies facing unnecessary contortions. Also, I find the MCI editor very complicated to use.

However, it's still the best—and probably the friendliest—of the emerging electronic mail options. And MCI Mail representatives (a helpful bunch) promised me that the glitches and loops will be fixed soon. In the meantime, I'll just keep on checking my mailbox.

Connie Winkler is a former executive editor for PC.

Dara Pearlman— Volkswriter Deluxe

As a professional writer, I'm very picky about word processing software. And because I review software for a living, I've had a chance to work with a lot of word processing programs. My favorite is Life-tree Software's *Volkswriter Deluxe*—it's fast, reliable, and easy to use.

First, a word about speed: If your PC has enough RAM, *Volkswriter*



Deluxe will load your text completely into memory, letting you jump from the top to the bottom of your document in less than a second. It scrolls from screen to screen with the same blazing speed, and even when it needs to call up part of the program from disk, the process never takes more than 3 or 4 seconds. Its efficient use of function keys gives single-keystroke access to most

editing commands, making it one of the fastest editors around.

As for reliability, it's hard to find a safer program than *Volkswriter Deluxe*. I've never lost a file, either through my own mistake or through a disk-full error.

And finally, there's ease of use. *Volkswriter Deluxe* has a well-designed series of menus that take you through most of the program's functions. Many menu-driven programs make you wander from menu to menu in search of the right command, but because *Volkswriter Deluxe* has packed all of its functions into only five menus, you're never more than a couple of keystrokes away from the function you need.

Although some competing programs perform better in specialized areas, such as print formatting, *Volkswriter Deluxe's* speed, reliability, and ease of use will keep it at the top of my list for a long time to come.

Dara Pearlman is a frequent contributor to PC.

Celebrate with

SOFTWARE

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Rainbow Writer Color Text Formatter	\$119
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Ashton-Tate	
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dBase III	359
Upgrade (dBase II to dBase III)	119
Framework	359
Friday!	169
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Personal Finance Programs	65
PC/Professional Finance Program II	149
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The Tax Advantage	39
Digital Research	
CP/M-86	39
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Financier II	115
Financier Tax Series	97
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FriendlyWriter (with FriendlySpeller)	55
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Sideways	45
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Harvard Project Manager	219
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Smartcom II	99
Please	225
Get free mailing list template for a limited time - also get a second template of your choice free from Hayes.	
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Speed Key	59
LifeTree	
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ThinkTank	109
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Symphony	call
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WordStar & Propak come with quick lesson	
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Infostar Plus (w/Starburst)	299
WordStar 3.3	179

PC Connection Software Special

through December 31, 1984

Professional Software, Inc.

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the hottest new computer game

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- 7 different categories, 3 skill levels
- Several methods of "handicapping" experts
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- Your PC can keep track of everything
- Runs on color or monochrome \$22

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Microsoft Serial Mouse with software	135
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Infoscope	149
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Peter Norton	
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Prokey 3.0	89
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TK/Solver	249
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PFS Access	59
PFS File	89

PFS Graph	\$89
PFS Plan	89
PFS Proof	59
PFS Report	89
PFS Write	79

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MultiMate (version 3.22 with spell checker & tutorial)	259
--------------------------------------------------------	-----

Virtual Combinatics

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VisiSchedule	129
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VisiWord Plus (with VisiSpell)	109

Warner Software

The Desk Organizer	139
--------------------	-----

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ATI

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CP/M-86	PC-DOS (2.1)
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Intro to Communications	39
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Davidson

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PC CONNECTION®



PC Pub.

Affairs of the hearth.

(Or, many are cold but few are frozen.)

Some people call Marlow, NH (pop. 544) the "icebox of New England." We call it home. And neither rain, snow, sleet, hail, freezing rain, freezing brains, or the occasional seismic rumble can keep our trained PC consultants from making it to work at our glitzy new headquarters.

There's nothing like central heating to bring in a crowd. And after work there's nothing like a strong fire, a pint of bitter, and a couple of games of J-Bird or Frogger to empty the old internal database.

They're just a bunch of animals.

Don't jump to any conclusions about the locals pictured above. We're PC experts up here, stuffed to the last brain cell with the latest information on PC products. Monitors, disk drives, add-on boards, keyboards, business software, games, and a whole lot more.

Not to mention mice — what we know about mice could overflow your first 64K.

So if you're ready to add a new twist to your IBM-PC (XT or AT) give us a call. We'll dazzle you with our prices, delight you with our service, amaze you with our shipping, and bemuse you with our dry New England wit.

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Where'd you get a mug like that?

Next time you find yourself wrapped around your PC on a cold winter night, pull out your PC Connection mug and fill it up with something legal. You'll find our mascot's face a welcome reminder that you are not walking the micro-computing road alone. The mugs are free to anyone who places a \$500.00 order between now and March 31.

Just call 1-800/243-8088 or 1-603/446-3383 anytime Monday through Friday 9:00 to 9:00, and Saturday to 5:30. If you're planning to visit us, bring snowshoes and call ahead to make sure what you want is in stock. The showroom closes at 8:00 M-F and at 5:00 on Saturday.



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For the IBM-PC (XT & AT) exclusively.

PC CONNECTION

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FX-80 with GRAFTRAX-Plus	call
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Hercules Graphics Card (parallel port)	319
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Deluxe keyboard (KB 5151)	call
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Kraft	
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Pinwriter P3(IBM) 132 col	897
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PCnet Blossom 64k Blossom Board with the Daughter Board installed call
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Princeton Graphics
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SR-12 RGB monitor (690 x 480) call
Scan Doubler Board (for SR-12) call
MAX-12 Amber monochrome monitor call

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New Expanded Quadboard 64k expandable to 384k, with clock calendar, parallel, serial & game port, I/O bracket, and Quadmaster software 259
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Quatchrome RGR Monitor 469

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Multiplan (Microsoft) dBase III
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Easywriter II Multimate
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STB

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TG
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Tandon

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TEAC

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Free 'y' cable & bracket with each pair.

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Datafile Disks SS/DD plastic box of 10 23.
Datafile Disks DS/DD plastic box of 10 33
Disk Drive Analyzer 22
Flip Sort (holds 75 disks) 19

MEMORY

64k Memory Upgrade Set for IBM-PC or XT system board 45.
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Compuserve

Compuserve Information Service (includes subscription, manual, 5 hours of connect time, monthly publications) 25.

Source Telecomputing

The Source (subscription & manual) 29

Junior's new look.

Over at Jr. CONNECTION, our consultants are pretty enthusiastic about IBM's relaunch of its not-so-pretty-at-first baby. New keyboard. Expanded memory potential. Admittedly, it's stuff we've been offering from non-IBM sources for months now. But the exciting thing is that IBM's new commitment will translate into a greater variety of hardware and software from third

party vendors.

If you own a jr, or are thinking about getting one, our jr. specialists can answer your questions and give you the latest product information. For your PC and XT, keep calling PC CONNECTION. For your PCjr., call Jr. CONNECTION - exclusively for the IBM-PCjr.

1-800/IBM-jr PC

PC CONNECTION®

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our spirited price

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Cw/Cat SAT (60 hour) 169

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Snooper Troops I (ages 10 to adult) 30
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Most Amazing Thing (ages 10 & up) 27
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the Witness (standard) 25
Planetfall (standard) 25
Cuthroat (standard) 25
Zork II (advanced) 29

PC Connection Hardware Special

through December 31, 1984

WICO

Command Control Analog Joystick

- 2 fire buttons mounted on base
- 3 1/2" handle has center/non-center option
- Dual heavy duty potentiometers for full 360° movement
- Trim pots are externally mounted for easy adjustment
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1-800/243-8088

PC Connection

340M

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603/446-3383

For the IBM-PC Exclusively.

Zork III (advanced) \$29
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Sorcerer (advanced) 29
Deadline (expert) 33
Starcross (expert) 33
Suspended (expert) 33
Invisicubes (hint booklets) are available for all Infocom games. Specify game 7

Microsoft

Flight Simulator 35

Origin Systems

Ultima III 39

Orion

J-Bird (you'll never sleep) 29

PC-Man

..... 25

PCSoftware

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Chess 2001 27

Championship Blackjack 23

Sir-Tech

Wizardry 42

Sierra-On-Line

Frogger 27

Crossfire (keyboard or joystick) 23

Ulysses and the Golden Fleece 27

Spectrum Holobyte

GATO 27

Strategic Simulations

The Warp Factor 27

Tigers in the Snow 27

Sublogic

Night Mission Pinball 29

HARDWARE

AST Research (For IBM-PC or XT)

All AST Boards come with SuperDrive, SuperSpool, and one year warranty
SixPakPlus 64k upgradeable to 384k, with clock calendar, serial and parallel ports (game port optional) 259

MegaPlus II 64k upgradeable to 256k (or more with MegaPak) with clock calendar and serial port (parallel, game, or second serial port optional) 259

MegaPak 128k (not upgradeable) call

MegaPak 256k call

I/O Plus II with clock calendar and serial port (parallel, game, or second serial port optional) 129

Parallel, Game, or second Serial Port for any AST board (specify board) 35

Connectal connector bracket (PC only) 19

AST-5251 559

AST-3780 629

MonographPlus with clock calendar, serial & parallel ports 429

Amdek

Video 300G monitor (green) 139

Video 300A monitor (amber) 149

Video 310A monitor (amber) 179

Compukey

Plastic Keyboard & Drive Cover Set 17

IBM Mono Screen Enhancement 17

IPC CONNECTION®



**Robin Raskin—
TellStar, Level II**
I will always remember 1984 as the year the heavens opened, thanks to the use of my PC and *TellStar, Level II*. Owning *TellStar* is like having a miniplanetarium in your living room. You can supply the program with your viewing location (latitude and longitude) and viewing time (date and hour), and *TellStar* will paint a customized picture of the celestial objects for your use as a personal dynamic star chart.

You can choose from nine different viewing orientations, including an overhead view—what you would see if you were lying in a grassy field gazing up. The interactive display lets you locate, identify, and learn about important celestial features.

Ask *TellStar* to identify a heavenly body appearing on the display, and it'll give you a host of astronomical goodies, such as the magnitude, right ascension and declination, rising time, and others. You can reverse the process and ask *TellStar* to locate any object in the program's star tables. A constellation mode lets you connect the heavenly dots and learn to spot the lesser-known constellations. Give *TellStar* a historic date, and it'll draw the stars of Christmas past. The documentation is equally useful for teaching astronomy's fundamental concepts as it is for explaining how the program works.

Although astronomy gurus shun the benefits of computer-aided astronomy simulations (there is some distortion on the display screen, and some accuracy is forfeited for speed), *TellStar* still has my vote as one of the year's best.

Robin Raskin writes frequently for PC.

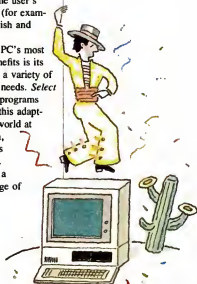
David Obregón— Select Bilingual

The *Select Bilingual* word processing system is one of the first mass-marketed applications to recognize that IBM PCs can play a significant role for people who conduct business primarily in languages other than English. Actually two separate, compatible systems in one, *Select Bilingual* offers excellent tutorials and documentation in the user's own language (for example, both English and Spanish).

One of the PC's most often-cited benefits is its adaptability to a variety of situations and needs. *Select Bilingual* and programs like it extend this adaptability to the world at large. As such, these programs bear watching. They open up a staggering range of opportunities for

American software producers, while helping to export the personal freedom and increased productivity afforded by microcomputers to countries and peoples around the world. The IBM PC can be an impressive ambassador of good will.

David Obregón writes New on the Market for PC.



Stephen Manes— Word Proof

Word Proof is a model of what software should be: useful, simple, fast, and cheap. For a mere \$60, you get a spelling checker with a dictionary as big as they come, the best on-line thesaurus around, and a rudimentary word processor to boot. Hosannas to IBM's till-now unsung authors, William Modlin and David Glickman.

Word Proof uses unique "slap-down" boxed menus that temporarily overlay what's on the screen. The spell-checking function lets you see everything in context, offers a helpful bunch of alternatives for each evil spell, and will even flag strange capitalizations. Put the cursor on a word and hit the F4 function key, and *Word Proof* displays a box full of well-chosen synonyms that come up fast, even from a floppy disk. There's even an anagram finder, and you can customize defaults to a fare-thee-well.

Stephen Manes is a contributing editor for PC.

The Norman Rockwell Award for Sophisticated Advertising

IBM has spent a lot of money and television air time persuading the American public that the PC is a highly sophisticated business resource. Even its use of a Charlie Chaplin stand-in emphasized the computer's use as a business tool.

But apparently the business community is not quite high-class enough for IBM. Big Blue's latest advertising coup is a 12-page special section in the September issue of *Reader's Digest*, entitled, "When will YOU start to use a computer?"

The supplement is laid out in typical Dick-Jane-and-Sally style, along with a nice, simple-to-understand story line about "typical" middle-class Americans (all bred on apple pie and milk, no doubt) smiling like idiots around their shiny new IBM PC. Gail and Scotty are visiting



Mary and Mark, who have just purchased their first, brand-new personal computer. (Mark obviously knows all about computers. In one illustration, he is shown demonstrating the machine's marvels with his thumb firmly pressed against the PC's IBM logo.) They are amazed. "Scotty spun in surprise, 'When would we use a machine like this?'"

As the exciting tale unfolds, Mark explains in fulsome, italicized prose how anybody, really anybody can use a PC. (There is even a follow-the-numbers explanation of how Gail interacts with an automated bank teller. You see, you do use computers!)

In fact, the general reading level for this ad seems to be about fourth-grade level—well below that of anyone who would even consider buying a microcomputer.

The story ends with a true-false quiz that asks the reader to find two services a personal computer can and cannot do for the average American (who seems to have, in IBM's opinion, very average intelligence). Among the exciting things a PC can do, according to the quiz, is relieve loneliness and help you pick the right dog. Isn't that neat? It's just what we all buy \$4,000 computer systems for.



John Dickinson— The Iomega Bernoulli Box

The only difficulty I can find with Iomega Corporation's Bernoulli Box disk drives is spelling the name. Other than that, they offer the shortest and perhaps sweetest road to 20 megabytes of high-speed removable storage on the market today.

Perhaps I can best explain my affection for the Bernoulli Box disks by telling you about their surprise arrival at my office-at-home. Like the proverbial babe on a doorstep, I found the disks on my back porch at about 6 o'clock one morning where they had been unceremoniously dumped by the delivery service the evening before.

It was obvious from the shipping carton's condition that it had been dropped off the back of a truck at least once during its trip from Ogden, Utah. Naturally I was worried about the disks' condition, so I proceeded to unpack them and hook them up. Iomega's manual is short and to the point, and

the procedures described are accurate, all of which makes installing the disks a breeze.

By my second cup of coffee, the Bernoulli Box disks and their DOS device driver were installed in my PC-XT, and each 10-megabyte disk cartridge was formatted. By my third cup of coffee, the entire software evaluation project I was working on for *PC Magazine* had been moved to the Iomegas and was functioning just as if it were still sitting on the XT's Winchester.

In a few brief moments my XT had grown from 10 to 30 megabytes of on-line storage. And it was storage that turned out to be as reliable, quiet, and quick as any Winchester disk now around. Better yet,

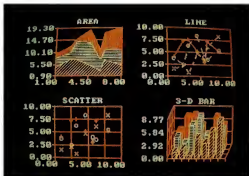
the Bernoullis provide a credible backup facility for a Winchester disk—one that doesn't require the incessant changing of many floppy disks.

Since PC-DOS thinks of the Bernoullis as oversized floppies, the BACKUP/RESTORE facility works just fine with them.

They're tough, too—Iomega representatives like to toss the removable cartridges (they cost \$80 each) around like Frisbees to demonstrate the point. The Bernoullis are hard to beat for a PC owner looking for mass storage, or a PC-XT owner looking for addition-

al storage with a good backup facility tossed in for the same \$3,695. (See "The Bernoulli Solution," *PC*, Volume 3 Number 18.)

John Dickinson was the project manager for PC's special issue on printers (Volume 3 Number 23).



Dick Aarons— KnowledgeMan

KnowledgeMan is more than a powerful integrated data management system: It's a complete programming environment flexibly designed to be used by both the professional software developer and the end user.

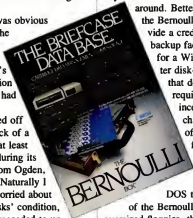
The elements of the *KnowledgeMan* package include a database management facility with an integrated spreadsheet and an optionally integrated screen paint utility (*KPaint*), a graphing utility (*KGraph*), a text editor (*KText*), and a mouse driver (*KMouse*). A run-time package (*KRun*) is

also available.

The database management facility allows unlimited memory variables and is accessed by a superset of IBM SQL query language combined with a Pascal-like structured programming language.

KnowledgeMan's capacity is limited, for the most part, only by the hardware configuration under which it is running, and it gives you total control over the programming environment through the use of over 100 environmental variables.

Dick Aarons is a contributing editor for PC.





Mitchell Waite— Virtual Graphics

The most significant announcement of 1984 has gone mostly unnoticed by the PC community. VDI graphics, or Virtual Device Interface, is IBM's first step to bring order to the chaos surrounding the PC graphics market.

VDI standardizes the way graphics are implemented on the IBM PC. Essentially, VDI is to graphics what MS-DOS is to operating systems. It establishes a standard set of "calls" to a graphics driver built into the computer. These calls include instructions to turn on a dot, draw a line, draw a rectangle, and fill an area with color. The graphics driver bridges a particular software product and a particular graphics board. It allows you to use any kind of graphics board you want with your

PC, as long as it sticks to the VDI standard.

If you think about this announcement for awhile, its relevance starts to sink in. VDI means that the graphics portion of a program does not have to be rewritten everytime the entire package is ported to a different computer. A product that runs on the PC with VDI will work on an AT, a Compaq, a PCjr, even a Macintosh, provided it has a VDI graphics driver. As graphics technology improves over the next few years and more resolution and color is offered to users, software written in VDI will be instantly adaptable. This is because VDI software "learns" from the graphics board what its capabilities are and then adapts to it on the fly. Thus a VDI version of *WordStar*, *Multiplan*, or *Flight Simulator* looks better used on computers equipped with better-resolution VDI boards.


It will be a while before the full significance of VDI sinks in, but when it does you will see a new convenience in PC software graphics.

Mitchell Waite is CEO of The Waite Group, a computer book packager in Sausalito, California.



Illustration: Kurt Vargo

The Scentuous Software Award

 Picture an office full of bright, imaginative, business-school graduates who have just been given the important job of creating a new advertising campaign for a major software manufacturer: Peachtree Software. What kind of attention-getting, Madison Avenue wizardry should they hit the market with? A concept geared toward their business audience? A sweeping campaign worthy of the huge salaries they are no doubt commanding?

How about something like peach-scented software?

In a strange move (for which the company has, no doubt, a perfectly reasonable explanation), Peachtree's ad mavens decided to submit their defenseless public to brochures reeking of some strange fragrance claimed to be peach. Without further comment, it can be said that this particular fruit has been out in the sun way too long.

John Helliwell— Mead Data Central

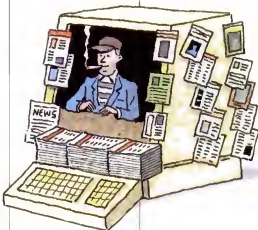
For PC owners who use on-line database services, the most significant event of 1984 was the impact of Mead Data Central's entry into the microcomputer revolution.

Mead has the largest library of full-text databases in the world. While most electronic database services deliver only bibliographic references, forcing you to go to a library to find the full text of the article or book, Mead's databases include every word that was actually printed in a wide range of publications. Mead's Lexis legal database holds 25 gigabytes of legal documents, while the companion Nexis service covers popular magazines such as *Forbes* and *Time*, newswire services such as AP, newspapers such as the *Washington Post* and *Computerworld*, and specialized trade journals such as *Coal Week International* and *Aviation Week and Space Technology*. The proudest jewel in Mead's Nexis crown is the *New York Times*, every word of it since June 1980. All the news that fits, Mead stores. And Mead's superior searching software is unmatched for locating what you want in a full-text database.

Until this year, the only

way to get at all this data was to rent Mead's special UBIQ terminal. Requiring UBIQs made sense when Mead's customers were native (the customized UBIQ is especially easy to use with Mead's databases) and when they didn't already have computers on their desks. In 1984, Mead realized that there were a lot of sophisticated, fully equipped potential customers out there who would prefer not to acquire another machine to access a single service. In response, Mead offered its services to users of IBM PCs and a number of other terminals and microcomputers.

John Helliwell is a Toronto-based consultant and writer.



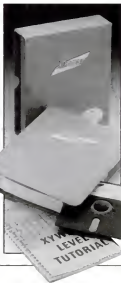
Bill Machrone— XyWrite II-Plus

XyWrite II-Plus, fast, flexible, and feature-laden, is the ultimate word processor for the PC. It also undergoes constant improvement. It's the second-easiest program I know of for installing printer drivers, and you can have any number of them. The key-

board is completely soft, allowing you to put any function on any key. You also have 36 buffers that can hold strings, commands, and program sequences. If you think of a feature that the designers omitted, you can write it in yourself in *XyWrite*'s internal programming language. It windows, respects subdirectories, and is the flat-out, absolute best for implementing color. Once you delve into *XyWrite*'s features, its typographic heritage is clear. It will create up to three separate indexes and three tables of contents from one document or a whole list of documents, control widows and orphans, and place footnotes at the end of a page or at the end of a document. Headers and footers can be any length. It also has a full-capability mail-merge function and can create on-screen forms for data entry.

As if this weren't enough, the program costs only \$295, and substantial quantity discounts are available. *Xyquest* now ships it with a nice tutorial, so the manual's plethora of commands shouldn't scare you off. Listen: *XyWrite II* is at least as good as I say it is, probably even better.

Bill Machrone is editor of PC.



Mike Edelhart— Expert Ease

The most intriguing product I saw during the past year was *Expert Ease*, an expert systems development tool based upon work by Edinburgh University's Donald Michie. The concept of *Expert Ease* fascinated me. The product lets you define logical rules and sets, create vocabulary for manipulating them, and produce a program that infers conclusions based upon your own, "expert" rules. But these capabilities are still fairly limited in *Expert Ease*; the product is just a first taste of expert systems. Still, this early glimpse into what may be next year's hottest software category left me hungry for more. Once you've worked with software that reflects your own thinking, it's hard to be satisfied with anything less.

Mike Edelhart is executive editor for PC.

Stephanie Stallings— iLINK

All the available local area networks, micro-mainframe links, and other intercomputer communications products don't do you much good if you can't transform data from one software package's format to another's. Some companies have begun addressing this problem by offering product-specific data extractors.

While these packages do give you some flexibility in file formatting, *iLINK*, by InfoCenter Software, goes a step further by offering a



number of software links in a single product. *iLINK* extracts from, transfers to, and converts formats among several IBM mainframe and PC applications, such as FOCUS, RAMIS, and SAS on the mainframe and *dBASE II*, *dBASE III*, *Data Base Manager II*, *1-2-3*, and *Symphony* on the PC. InfoCenter Software plans to continue releasing links for popular PC software. If you need customized bridges among other products, databases, or languages, InfoCenter will provide them or assist you in writing your own.

To move data from one environment to another, you follow several consistent steps. To download data from a mainframe database to your PC, for instance, you first use a communications package to log onto the mainframe. Then, with the aid of *iLINK*'s mainframe menus, you extract the data you're interested in, put it into a

standard *iLINK* Information Interchange Format, and download it to your PC disk. Returning to PC mode and using *iLINK*'s PC menus, you now convert the data into DIF or CSV format and import it into your PC application. Uploading and crossloading work is done in a similar fashion.

Now that networking hardware and software are coming into their own, we will continue to see data transfer software that emphasizes flexible data transfer without bogging you down with the mechanics underlying it. In 1984, InfoCenter Software's *iLINK* successfully met this new challenge. ■

Stephanie Stallings is an associate editor for PC.



POCKET FILE

All's for the Best

Although the best things in life are free, the best in computers is not. Here are prices and other information for some of the products mentioned in this article.

ASYST

Macmillan Software Co.
866 Third Ave.
New York, NY 10022
(212) 702-3428

List Price: For module #1, \$795; #1 and #2 or #1 and #3, \$1,290; #1, #2, and #3, \$1,695.

Requires: 320K RAM, one disk drive, DOS 1.1 or 2.0, 8087 math coprocessor, data acquisition board.

CIRCLE 643 ON READER SERVICE CARD

Bernoulli Box

Imega Corporation
1821 West 4000 South
Roy, UT 84067
(801) 773-9452

List Price: \$2,695 for single drive; \$3,695 for double drive.

Requires: 128K RAM, one disk drive.

CIRCLE 642 ON READER SERVICE CARD

CS-5 Solid Modeling System

Cubicom Corporation
3165 Adeline St.
Berkeley, CA 94703
(415) 540-5733

List Price: \$11,900

Requires: 512K RAM, two disk drives, 8087 coprocessor, high-resolution RGB monitor.

CIRCLE 641 ON READER SERVICE CARD

Expert-Ease

868 West End Ave.,
Suite 3A
New York, N.Y. 10025
Tel. (212) 662-7206

List Price: \$2,000 + \$50 shipping charge.

Requires: 128K RAM, 1 disk drive.

CIRCLE 576 ON READER SERVICE CARD

Fujitsu SP830 Printer

Fujitsu America, Inc.
3055 Orchard Drive
San Jose, CA 95134
(408) 946-8777

List Price: \$2,295

Requires: Connecting cable.

CIRCLE 639 ON READER SERVICE CARD

H-P LaserJet Printer

Hewlett-Packard
1820 Embarcadero Rd.
Palo Alto, CA 94303
(800) 367-4772

List Price: \$3,495

Requires: 1725B interface cable.

CIRCLE 638 ON READER SERVICE CARD

IBM PC AT

IBM Entry Systems
Division
P.O. Box 1328
Boca Raton, FL 33432
(800) 447-4700

List Price: \$3,995 with 256K RAM, 1.2-megabyte floppy disk drive; \$5,795

with 512K RAM, 1.2-megabyte floppy disk drive, 20-megabyte fixed disk, serial/parallel adapter.

CIRCLE 637 ON READER SERVICE CARD

iLink

InfoCenter Software
171 Main St.
New Paltz, NY 12561
(914) 255-8925

List Price: Complete system, \$12,500; additional links, \$1,000; additional PC disks in units of 10, \$4,000 (\$400 each).

Requires: 128K RAM, one disk drive, mainframe IBM 370, 43xx, or 30xx system.

CIRCLE 636 ON READER SERVICE CARD

Infoscope

Microstuf, Inc.
1000 Holcomb Woods
Parkway
Suite #440
Roswell, GA 30076

(404) 998-3998

List Price: \$225

Requires: 192K RAM, two disk drives.

CIRCLE 635 ON READER SERVICE CARD

KnowledgeMan

Micro Data Base
Systems, Inc.
P.O. Box 248
Lafayette, IN 47902

(317) 463-2581

List Price: \$500

Requires: 192K RAM, two disk drives; for graphics: IBM color graphics card, color monitor.

CIRCLE 634 ON READER SERVICE CARD

LaserJet

Hewlett-Packard
11000 Wolfe Rd.
Cupertino, CA 95014
Tel. (800) FOR-HPCC

List Price: \$3,495

CIRCLE 578 ON READER SERVICE CARD

Lattice C Compiler

Lifeboat Associates
1651 Third Ave.
New York, NY 10028
(212) 860-0300

List Price: \$500

Requires: 128K RAM, one disk drive, linkage editor.

CIRCLE 633 ON READER SERVICE CARD

**PC MAGAZINE****MCI Mail**

MCI Communications Corp.
1133 19th St. NW
Washington, DC 20036
(202) 887-2158

List Price: Depends upon service.

CIRCLE 632 ON READER
SERVICE CARD

NUTSHELL

Leading Edge Products, Inc.
21 Highland Circle
Needham, MA 02194
(800) 343-3436

List Price: \$395

Requires: 256K RAM, one disk drive.

CIRCLE 631 ON READER
SERVICE CARD

Power Director

Computer Accessories Corp.
7696 Formula Pl.
San Diego, CA 92121
(619) 695-3773

List Price: Model p-22, \$99; p-02, \$139; p-12, \$199.

CIRCLE 629 ON READER
SERVICE CARD

ProKey, Version 3.0

RoseSoft
4710 University Way NE
Seattle, WA 98105
(206) 524-2350

List Price: \$129.95

Requires: 64K RAM, (96K RAM with a large program like WordStar), one disk drive.

CIRCLE 628 ON READER
SERVICE CARD

Report Manager, Advanced Version

Datamension Corporation
615 Academy Drive
Northbrook, IL 60062
(312) 564-5060

List Price: \$495

Requires: 128K RAM, two disk drives, printer.

CIRCLE 627 ON READER
SERVICE CARD

Select Bilingual

Select Information Systems, Inc.
919 Sir Francis Drake Blvd.
Kentfield, CA 94904
(415) 459-4003

List Price: \$395

Requires: 128K RAM, two disk drives.

CIRCLE 626 ON READER
SERVICE CARD

TellStar, Level II

Spectrum HoloByte, Inc.
2006 Broadway, Suite 301
Boulder, CO 80302
(800) 621-8385 ext. 262

List Price: \$99.95 plus \$3 shipping and handling.
Requires: 128K RAM, graphics display adapter, DOS 2.0 or later.

CIRCLE 625 ON READER
SERVICE CARD

Turbo Pascal; Sidekick

Borland International
4113 Scotts Valley Drive
Scotts Valley, CA 95066
(408) 438-8400

List Price: \$54.95 each.

Requires: Turbo Pascal; 48K RAM, one disk drive; Sidekick: 128K RAM, one disk drive.

CIRCLE 624 ON READER
SERVICE CARD

VDI (Virtual Device Interface)

Comes as part of Graphics Development Toolkit.

List Price: \$395 for IBM Graphics Development Toolkit available through IBM dealers.

CIRCLE 623 ON READER
SERVICE CARD

Volkswriter Deluxe

Lifetree Software, Inc.
411 Pacific St.
Monterey, CA 93940
(408) 373-4718

List Price: \$295; update for original Volkswriter, \$100.
Requires: 128K RAM, two disk drives, DOS 1.1 or 2.0.

CIRCLE 622 ON READER
SERVICE CARD

Watson

Natural MicroSystems
6 Mercer Rd.
Natick, MA 01760
(617) 655-0700
(800) 6WA-TSON

List Price: \$849 w/300-baud modem; \$998 w/300-to 1200-baud modem.
Requires: 192K RAM, two disk drives, DOS 2.0 or later.

CIRCLE 621 ON READER
SERVICE CARD

Word Proof

Sierra On-Line, Inc.
P.O. Box 1328
Boca Raton, FL 33432
Tel. 800-447-4700

Price: \$60.

Requirements: 96K, 1 disk drive.

CIRCLE 577 ON READER
SERVICE CARD

Xeno-Copy and Xeno-Copy-Plus

Vertex Systems
6022 West Pico Blvd.
Suite #3
Los Angeles, CA 90035
(213) 938-0857

List Price: Xeno-Copy, \$99.50; Xeno-Copy-Plus, \$149.50.

Requires: 128K RAM, two disk drives.

CIRCLE 620 ON READER
SERVICE CARD

XyWrite II-plus

XyQuest Inc.
P.O. Box 372
Bedford, MA 01730
(617) 275-4439

List Price: \$295 plus \$5 shipping and handling.
Requires: 128K RAM, one disk drive.

CIRCLE 619 ON READER
SERVICE CARD



If you're not sure what's the best multi-function board for your PC, don't give up. Persyst.

Before you look at the board, look at the warranty.

A warranty tells you how much confidence a company has in its products. While other boards get a warranty for just one year, every Persyst board carries a full two-year warranty. Of course, we couldn't afford to give such a strong warranty if we didn't have such a strong product.

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Every Persyst board gets the best of everything: in materials, design and testing. For instance, they go through a 24-hour burn-in process and system-level testing in an IBM PC with IBM software. The result: a return rate that's the lowest in the industry — just .01%.

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With our SB384, you get all the innovations and features you need and want. You can have up to 384K in memory. Along with a serial port, a parallel port, game port and a calendar clock. And, it's all on one board!

Plus, the SB384 comes with software for RAM-Disk emulation and print spooling: a total of seven functions in just one slot.

Now you can decide.

As you can see, the best way to decide on which multi-function board is right for you is to look at more than just the board. Examine the warranty that stands behind that board, the quality that goes into it, and the features

it offers. This way you'll discover that Persyst is way ahead of the others in every area.

The Persyst SB384 is a product of Emulex Corporation, an industry leader in the development of high-performance controllers, communications products and packaged subsystems for PCs, micro, mini and super minicomputers. For more information call or write us today. Persyst Products, 3545 Harbor Boulevard, P.O. Box 6725, Costa Mesa, CA 92626. Tel. (714) 662-5600.

CIRCLE 512 ON READER SERVICE CARD

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- On June 24th, 1984, in the Business Section of the San Francisco Examiner & Chronicle, John Dvorak recommends Micro Flash as one of the "companies with a future"
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- \$6.00 for UPS surface (except for printers and monitors)
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AST Research		
SixPakPlus 64K	395.00	269.00
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ADVANTAGE! 128K for AT	495.00	379.00
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Hayes Smartmodem 1200B	539.00	439.00
Hercules ColorCard	245.00	196.00
Hercules Graphics Card	499.00	369.00
OMEGA Bernolab Box 20MB	3695.00	2995.00
Plantronics PC+ COLORPLUS (SYMPHONY COMPATIBLE)	560.00	389.00
Printers — Epson, Okidata, Diablo		
NEC, JUKI & Others		SCALLS
Princeton Graphics		
MAX-12 Amber Monitor	249.00	189.00
HX-12 HI-RES RGB	695.00	524.00
SR-12 SUPER HI-RES RGB		
Monitor w/Scan Doubler	1049.00	843.00
PTI DataShield Back-up Pwerr		
Supply — 200 Wtts.	359.00	325.00
Percyst 80B Display Card	595.00	478.00
Taxan 440 RGB w/Text Switch	699.95	759.00

SOFTWARE	RETAIL PRICE	MICRO FLASH
Ashton-Tate dBaseIII	\$ 895.00	\$ 369.00
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BPI Systems Accounting aa.	595.00	398.00
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Haman Edge Mind Prober	49.95	39.00
Lifelink Lattica C Compiler	500.00	354.00
Living Videotext Think Tank	145.00	110.00
Microsoft*		

Multiplan™	195.00	139.00
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Morgan Computing Trace 86	125.00	95.00
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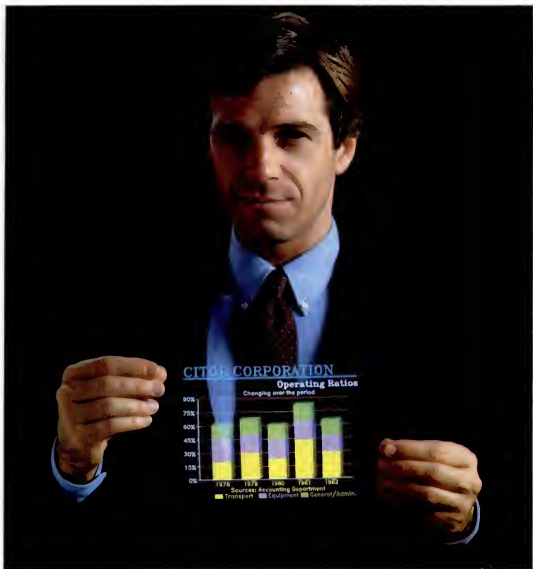
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SPECIAL REPORT • KATHRYN ALESANDRINI



GRAPHICS THAT DRESS FOR SUCCESS

Full-service graphics software can help executives transform their business presentations from dull to dynamite without artistic or programming skills.

As Geraldine (Flip Wilson) so aptly put it a few years ago, "What you see is what you get." Geraldine wouldn't know an XT from an AT, but her insight explains why graphics presentation software for the PC is growing almost as fast as the national debt. People "get" what they see but filter out or forget much of what they read and hear. The importance of business presentation graphics cannot be overstated because it is the visual message, not the verbal, that exerts power and influence in the business world. Armed with full-service graphics packages such as *ExecuVision*, *HyperGraphics*, or *EnerGraphics*, you can create colorful, animated, 3D graphics that make your ideas more appealing and acceptable to others.

The icing on the cake is that you don't need to be an artist or a computer programmer to create snappy presentation graphics with your PC.

Studies Show . . .

What's wrong with your numerical financial reports, "chalk talk" departmental meetings, written reports, and verbal sales presentations? Everything! Verbal presentations and reports are less convincing than graphic presentations, and they make the presenter appear to be less prepared, less concise, less interesting, and less professional than those who use graphics. That's what a recent study showed about the effects of using graphics in a business meeting. The 6-month study was conducted with MBA students at the

Wharton Business School under a grant from 3M Corporation. The study compared marketing presentations about a hypothetical product ("Crystal" beer) that included either business graphics presented via an overhead projector, or only written handouts and verbal information. The findings, based on work with 36 groups, dramatically support the use of presentation graphics:

Graphics are persuasive. Presenters who used visuals succeeded in persuading a group in their favor 67 percent of the time, while verbal presenters succeeded only 50 percent of the time. Thus, businesspeople who limit themselves to verbal presentations are severely limiting their effectiveness.

Graphics shorten meetings. The meeting time was reduced by 28 percent when presentation graphics were used. A representative of 3M noted that the savings in time gained by reducing meeting length by only 28 percent could add up to as much as 42 extra working days per year.

Graphics aid decision making. When graphics were used in the presentation, 64 percent of the group said that they made



DRESS FOR SUCCESS

their business decisions "immediately after the visual presentation." When graphics were not used, the control group delayed decision making until "sometime after the group discussion following the presentation."

Graphics promote group consensus. Reaching a consensual decision occurred in 79 percent of the groups seeing graphics, compared to a 58 percent consensus

rate for the groups not shown the graphics.

Graphics make a good impression. The presenters who used graphics as part of their presentations were perceived by the group as being more effective than those not using graphics. Specifically, the person making the presentation was perceived as being clearer, better prepared, more credible, interesting, concise, and more professional.

In sum, graphics are good business. The study showed that presentation graphics not only make the presenter look good, but get the job done faster and better. What's wrong with verbiage and long lists of data? Plenty! The hidden cost of verbiage takes its toll in boredom during reading, longer reading times, inferior recall of important information, slower decision making, lengthier meetings, and poorer attitudes.

Appearances Are Important

Before you can really get down to business with your PC in creating high-quality presentation graphics, you must consider appearances. Viewers will be influenced by the visual quality of your graphics. Yet without special equipment in addition to software, your graphics will be plagued with the "jaggies"—rough edges that are a dead giveaway that your graphics were not created in the art department. Until recently, the jaggies have been a major obstacle to the widespread use of PC-based presentation graphics. Recently, however, some new products have appeared that let you create professional-looking slides from your PC without the characteristic raggedy edges. One such product is the Samurai film recorder from Image Resource Corporation: it has a price tag under \$10,000, but the look to its displays rivals systems costing ten times more (see "Samurai Image Processor" in this issue).

Appearances are important whether you are working with slides, prints, or

graphics—anything that will remain on the screen for display. You can make the most boring data in the world come alive if you know how to use color, 3D effects, and animation. But the bad news is that you can do more harm than good if you create graphics that are colorless, static, or oversimplified. You can also get yourself

You can make the most boring data in the world come alive if you know how to use color, 3D effects, and animation.

into trouble by distorting the facts and figures as you create a visual representation. You would probably denounce a distortion of the facts in a written report as lying, but you may not have the "visual literacy" to create an honest yet snappy visual message. That's where a full-service graphics package comes to your aid.

Full-Service Graphics Software

Charts and graphs have been termed *abstract graphics* because they abstract, or symbolize, the information they portray. Most of us would rather view these abstract graphics than sift out verbal information or search through endless tables of data. But given the choice, we find realistic graphics even more interesting than abstract. *Realistic graphics* refers to drawings that share a physical resemblance with the concept that the graph represents. The advantage of including realistic graphics in your presentations is that peo-



VCN ExecuVision

Visual Communication Network
200 Old Tappan Rd.
Old Tappan, NJ 07675
(800) 624-0023

List Price: \$395 (plus graphic libraries, \$80 to \$90).

Requires: 128K RAM (256K with DOS 2.0 or later), two disk drives, color graphic adapter.

CIRCLE 647 ON READER SERVICE CARD

HyperGraphics

HyperGraphics Corp.
207 W. Hickory, Suite 202
Denton, TX 76201
(214) 783-9900
(817) 565-0004

List Price: Authoring system, \$395; business presentation system, \$349.

Requires: 128K RAM, two disk drives, Colorgraphic card (128K, medium- or high-density), color monitor.

CIRCLE 648 ON READER SERVICE CARD

EnerGraphics

EnerGraphics Research
150 North Meramac, Suite 207
St. Louis, MO 63105
(800) 325-0174

List Price: \$350; \$450 with plotter option.

Requires: 128K RAM.

CIRCLE 649 ON READER SERVICE CARD

ple will pay closer attention to your ideas. The major advantage of full-service graphics software is that you can use it to spruce up your abstract graphics with realistic images, making your presentation more interesting and influential. A number of packages allow the creation of freeform graphics, including *EnerGraphics*, *4-Point Graphics*, *Graforth*, *Graph N' Calc*, *HyperGraphics*, *Super Chartman II*, and *The Graphic Solution*, to name a few. If you are wary of creating your own freeform images but want the advantages of realistic graphics, you can turn to *ExecuVision*, which provides libraries of pre-stored graphics that can be combined with your charts and graphs. Figure 1 shows a selection of realistic graphics that you can "cut and paste" to create your own visual message.

One common mistake made by people new to graphics is that they think many topics cannot be depicted visually. Data tables and verbiage seem the only alternative. It's true that much of the information you deal with daily is not simple and "pictureable," but abstract and complex. Don't despair. Presentation graphics software can once again come to your aid. Although abstract topics and ideas cannot be *directly* portrayed, they can be portrayed *indirectly* by showing the concrete associates, examples, or effects that the information has on objects that can be visualized. The example in Figure 2 shows an indirect graphic (the Eiffel Tower) used as a concrete associate of "airline travel." The resultant graphic is interesting and effective.

When no other type of graphic is possible, you can always turn to symbolic graphics such as flowcharts, networks, maps, tree diagrams, and other schematized charts and diagrams. The importance of these in business cannot be overstated because they can be used to help organize and communicate the most abstract and complicated information. Studies other

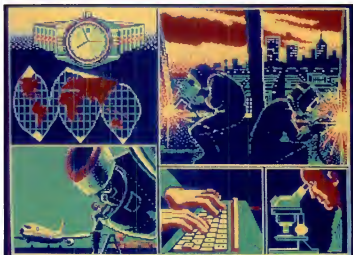


Figure 1: A sample of realistic images that are available from ExecuVision's prestored graphics.

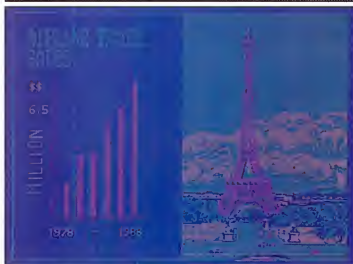


Figure 2: Using the Eiffel Tower to suggest "travel" makes the chart more vivid and increases the viewers' interest.

DRESS FOR SUCCESS

than the one done for 3M also support the value of using this type of graphic to get a point across more effectively than merely verbalizing it or showing tables of data. Imagine how much longer it would take you to understand the organizational structure shown in Figure 3 if you had to read about it.

VCN ExecuVision

ExecuVision is a delightful program for those of us who can draw only stick figures but have always wanted to be ranked

with the visually literate. It not only generates the normal business graphics such as bar graphs and pie charts but also permits drawing, animation, and special effects.

The menu-driven package is easy to use and is also compatible with *VisiTrend/Plot*. *ExecuVision* provides collections of realistic graphics and symbols that you can pick and choose for your own presentations. The library collections currently available include borders, initials and decorative design, an industry and business

catalog, and professions (the world's faces and figures), as well as maps and international symbols.

ExecuVision allows you to create a slide show that will run automatically or under your control. The strength of the package is that you can use its realistic graphics to add interest to an otherwise verbal presentation, as shown in Figure 4, or you combine them with your more abstract charts and graphs, as is done in Figure 5. *ExecuVision* is truly a full-service graphics package that can change your



Figure 3: Symbolic graphics like this diagram help visually organize otherwise confusing information.

presentations from dull to dynamic.

HyperGraphics

HyperGraphics is another full-service presentation graphics package that allows you to create snappy graphics and animation with no programming (see Figures 6 and 7). It also gives you the flexibility of using the software in your own programs, transferring control back and forth from your program to *HyperGraphics* as needed. The package allows slide shows, including true animation and preselected ordering of "pages."

One special feature of this software is that it comes with a tutorial disk to explain and demonstrate its use. The tutorial itself was produced with *HyperGraphics* and showcases the software's features. Text, graphics, and animation can be combined on the same page with no programming. Graphics can be saved on disk and transferred for use by other packages.

A newly added feature of this package is that, like *ExecuVision*, it also provides prerendered drawings for you to use in creating your presentations. The six picture libraries contain PC components, U.S. maps, world geography, borders, fonts, and faces.

For those who do program, *HyperGraphics* is a full-service graphics package that you can tailor to your specific situation and interface with your own programs.

EnerGraphics

EnerGraphics may take more time to master than *ExecuVision*, but it has several advantages for users who want a real 3D appearance rather than the pseudo-3D look of *ExecuVision* and *HyperGraphics*. Like the other packages, you can use it to create free-form graphics, slide shows, and the standard charts and graphs. Yet one unique feature of *EnerGraphics* is its ability to represent real three-dimensional surfaces, helped by the added features of



Figure 4: Realistic graphics such as this one add interest value to the text of a business presentation.

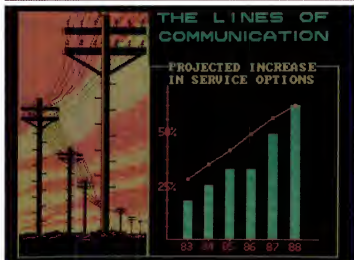


Figure 5: This concrete "associate" from PCN *ExecuVision* makes it easier to convey abstract information.

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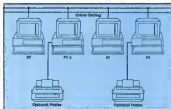


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Figure 6: HyperGraphics gives users the option of using the software in combination with other programs.

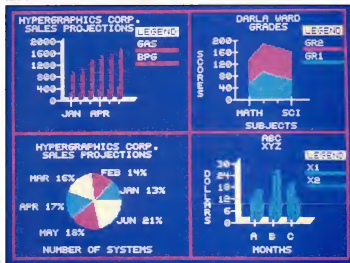


Figure 7: This HyperGraphics pie chart also comes equipped with an animated arrow that will point out figures of interest.

color, zoom, rotation, hidden-line removal, and perspective (Figure 8). Another feature lets you easily edit your charts and graphs, making the package particularly suitable for creating flowcharts, organizational charts, and other schematized graphics.

EnerGraphics offers the statistician several features not found in many packages. It can do statistical analysis, fit a line to data, or plot a polynomial function.

Graphics are definitely important for appearances. They can make you look good by creating an image of professionalism.

You can also run regression analyses with the package—a useful feature for researchers and forecasters.

EnerGraphics gives you access to dynamic 3D graphics that can excite and stimulate a viewer and make your ideas really come alive.

Get the Picture

Business goes better with graphics. Graphics are definitely important for appearances. Graphics can make you and your business look good by creating an image of quality and professionalism. But the real power of presentation graphics in business goes beyond mere appearances.

The importance of graphics for really getting down to business cannot be overstated. Studies prove that graphic communication is more effective than verbal. In

3-D SURFACE

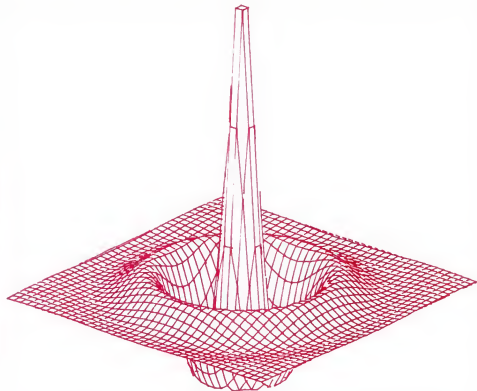


Figure 8: EnerGraphics allows users to create and view 3D surfaces from any angle.

an age that regards information as its most important commodity, those who succeed in business will be the ones who succeed in managing information. Graphics allow you to manage information more effectively than do words and numbers alone.

You cannot afford to be without presentation graphics software in this age of information technology. ■

Kathryn Alesandrini is a speaker, consultant, and author of the upcoming book,

Business Graphics for Information Management (Prentice-Hall, Inc.). She is president of MicroConnect, a small firm in Santa Monica, California, that specializes in graphics applications for training and management.

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SPECIAL REPORT • JACK BISHOP

CHARTING YOUR COURSE ON THE PC

Whether you're plotting marketing strategy or planning for production, business presentation graphics can help ensure smooth sailing.

A mainframe computer can create impressive business graphics, especially if you have high-quality peripherals such as plotters, monitors, and screen cameras, and experienced technicians to run the system. Fortunately, the makers of business graphics packages for the PC have kept in mind that the person who designs the graphics is probably the one who uses them, and so have put ease of use before power. Within the constraints of memory and processing power, you can design interesting and presentable business graphics on the PC.

As a management consultant, I have found that different business operations need different graphics features. For this article, I have drawn examples from my

practice of how graphics are used in six major business operations. I chose different packages for different jobs, since I have yet to find the perfect, all-around package. I selected the software from about ten packages. I selected the software from about ten packages I have reviewed for clients over the past year. I tried to put myself in your shoes when making my choices—your priority is to get the job done with whatever tool seems to work well. I used the program of my choice to create at least one chart for each example. In some cases, only that program can produce such a chart.

Marketing and Sales

If you are concerned with sales, two key questions always need answers: How

big is the market? How fast is it growing? With business graphics, these answers needn't be a table of numbers that puts the audience to sleep. A bar chart, for example, illustrates the size and growth of a market effectively. Traditional vertical bar charts offer limited space for labels such as regions or salespeople. Although some software packages permit you to write the names of the bars on a slant, the limits are still substantial. For clarity and flexibility, pick a package with a horizontal bar option.

Decision Resources's *Chart-Master* is a menu-driven, flexible package that makes a pretty chart. When I wear my marketing/sales hat, I don't want to fuss with learning a computer language, so the *Chart-Master* menus are ideal. *Chart-Master* has sufficient power and is easy enough to use for business professionals who want to make an occasional chart.

An effective chart conveys the message loudly and clearly (see Figure 1). What catches the eye first is the title, and I like the elegant simplicity of *Chart-Master*'s menu structure, which lets you pick the most effective type style and size. I used a

CHARTING YOUR COURSE

complex roman type font with both large and small uppercase letters on the same line. Such flexibility in font and size options is rare, and *Chart-Master's* ability to change color, font, and size within a line is even rarer. In Figure 1, I kept the style for the names of each region simple. Using five colors on the chart may reduce readability, but not past the limits. I changed both the color and texture for the two sets of bars so that the chart remains legible after photocopying. To increase its effectiveness, I added the inner and outer boxes that frame the chart. Such details that *Chart-Master* (and some of its competitors) offers increase the chart's impact.



1-2-3
Lotus Development Corporation
161 First St.
Cambridge, MA 02142
(617) 492-7171
List Price: \$495
Requires: 192K RAM, two double-sided disk drives.

CIRCLE 644 ON READER SERVICE CARD

SuperCalc³
Sorcim Corp.
2195 Fortune Dr.
San Jose, CA 95131
(408) 942-1727
List Price: \$395
Requires: 256K RAM, two double-sided disk drives or hard disk.

CIRCLE 645 ON READER SERVICE CARD

Chart-Master
Decision Resources
Sylvan Rd., South
Westport, CT 06880
(203) 222-1974
List Price: \$375
Requires: 192K RAM, two double-sided disk drives.

CIRCLE 646 ON READER SERVICE CARD

I chiefly picked *Chart-Master* for its ability to plot the chart's two sets of bars against two separate y axes, one for the growth rate and the other for market size. Again, *Chart-Master's* flexibility is rare, as is its ease of use.

With *Chart-Master*, I produced the chart in Figure 1 from scratch in about 30 minutes, including 5 minutes to plot it on a HP7470A. Restricting the colors to those of the two pens this plotter holds cuts plotting time to less than 2 minutes. With a one- or two-pen plotter, a five-color chart requires pen switching. Swapping pens by hand leads to errors and ruined charts unless you are careful. You need notes to

tell yourself which pen is required next; *Chart-Master* prompts only when a change in color is needed, without telling you which color. Although some programs show the color (and width) of the pen that is needed, your memory or notes must overcome this limitation in *Chart-Master* and similar programs. A plotter with five or more pens solves many of the problems, because the pens are selected automatically by number.

I like to preview charts on the screen because plotting on paper takes longer and uses up paper and pens. The *Chart-Master* screen preview saves time in reaching a text size that works and in ensuring that the chart looks right. *Chart-Master* also lets you verify the characteristics of and data in the chart with a hard copy of the underlying data (see Figure 2). This hard copy is essential documentation for an analysis or presentation.

Advertising

How much to spend for advertising? One key is how much competitors spend. The big hitters would dominate a bar graph of competitors and their advertising budgets. A straightforward scatter chart of amounts spent on advertising and associated sales volume reduces this problem and presents the data conveniently and effectively.

I chose Digital Research's *DR Graph* for the chart because of its annotation feature that permits you to identify key players and the ease of use its menu structure. *DR Graph* also has some powerful ways to treat the data.

The resulting chart is on target, laying out the spending and volume levels clearly (see Figure 3). Differences in advertising productivity become the subject of a spell-binding presentation.

DR Graph offers four sizes for the text, a simplification for ease of use without sacrificing much flexibility. I would prefer the axis identification to be a bit smaller

DR Graph
Digital Research
60 Garden Ct.
Monterey, CA 93942
(408) 649-3896
List Price: \$295
Requires: 256K RAM, two double-sided disk drives.

CIRCLE 647 ON READER SERVICE CARD

GrafTalk
Redding Group
109 Danbury Rd.
Ridgefield, CT 06877
(203) 431-4661
List Price: \$450
Requires: 128K RAM, one double-sided disk drive.

CIRCLE 648 ON READER SERVICE CARD

Graphwriter
Graphic Communications, Inc.
200 Fifth Ave.
Waltham, MA 02254
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List Price: \$595
Requires: 256K RAM, two double-sided disk drives.

CIRCLE 649 ON READER SERVICE CARD

MARKET SIZE & GROWTH

BY REGION

1984

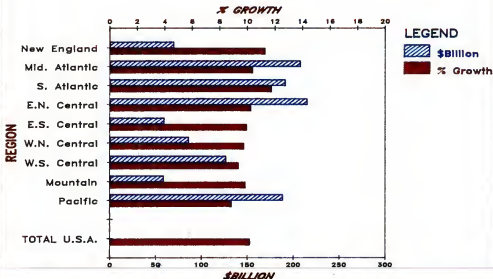


Figure 1: Market Size and Growth. Chart-Master provides an effective horizontal bar chart to support marketing and sales. Colors and inner and outer boxes framing the chart improve its impact.

and the axis legend a bit larger, but neither is possible; unfortunately, the size, font, and color of text cannot be altered within the line. The limitation should be only a minor disappointment. Because colors, sizes, and fonts are selected by number, I used a little card to keep track of the information, which is scattered through the manual.

The big hitters still dominate the simple chart, however, even within the top 25 spenders. To remedy this defect, *DR*

Graph has another way to review and present the data—it can use logarithmic scales on one or both axes, a rare ability. Logarithmic scales are useful because they show a linear growth rate, rather than linear values as in a conventional chart. Figure 4 shows the second way to review the data, trading the simplicity of rectangular coordinates for the power of logarithmic axes. When I tried to replace the annotations, however, the system hung. I tricked *DR Graph* into providing new annotations

by moving the two legends while the scales were set for rectangular coordinates, saving the chart, switching the coordinates to logarithmic style, charting the result, and readjusting. What should have taken 30 minutes, however, took a couple of hours. The time was worth spending once, but the magic would fade quickly in the office.

Nonetheless, *DR Graph* is a powerful, effective tool for the productivity-minded advertising manager.

(continued)



CHARTING YOUR COURSE

TITLES:

MARKET SIZE & GROWTH
BY REGION
1984

AXIS LABELS:

X: REGION

Y: \$BILLION

VARIABLE 1 : \$Billion

X-AXIS	Y-AXIS
-----	-----
New England	70.7
Mid. Atlantic	208.4
S. Atlantic	191.8
E.N. Central	215.7
E.S. Central	60
W.N. Central	86.7
W.S. Central	127.4
Mountain	59.4
Pacific	189.1
	NA
TOTAL U.S.A.	NA

VARIABLE 2 : % Growth

X-AXIS	Y-AXIS
-----	-----
New England	11.3
Mid. Atlantic	10.4
S. Atlantic	11.8
E.N. Central	10.3
E.S. Central	10
W.N. Central	9.8
W.S. Central	9.4
Mountain	9.9
Pacific	8.9
	NA
TOTAL U.S.A.	10.2

Figure 2: Chart-Master Verification of the Chart. A hard copy version of the data and settings in a chart is an essential feature of good business practice.

Research and Development

Analyzing research data is an important part of research and development. Although many analyses exceed a spreadsheet's scope, simple spreadsheet calculations and graphics help screen and evaluate data. By graphing the data, you can identify trends and outlying data points for later statistical analysis.

SuperCalc³ is a convenient tool for such analyses because it keeps track of up to nine separate charts per spreadsheet.

SuperCalc³ lets you plot your chart and revise it without leaving the spreadsheet.

You can also use its ability to rearrange the data before charting to let you screen and analyze the data to some degree.

Recently, a scientist was investigating the early development of cellular structure, using these techniques to sort and evaluate data from three species. *SuperCalc³* was able to do both calculations and graphics, producing an excellent plotted chart without having to leave the spreadsheet. Each observed estimate of the length, width, and breadth of each cell was entered into the spreadsheet. As you can see in Figure 5, I used *SuperCalc³* to estimate the volume of each cell (a simple calculation), then to sort the 190 data points by distance from the nurse cell. The spreadsheet's average, maximum, and minimum features were used to characterize the data. Finally, the sorted data were charted to illuminate trends and identify outlying data points for further analysis.

SuperCalc³ shines in several respects.

ADVERTISING & SALES General Merchandise Retailing

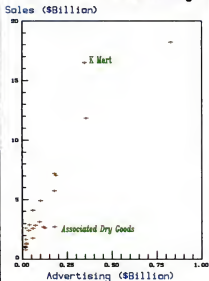


Figure 3: Advertising and Sales. DR Graph illustrates the range of advertising spending and associated sales volumes for 25 retailers of general merchandise.

Data entry is easy because you can set *SuperCalc*³ to move to the next position for data entry after you enter each point. The calculations are straightforward, and replication of the volume formula is simple. Because I wanted to graph the series by several subcategories, the feature that ties several charts to the same spreadsheet was helpful. I also like the fact that *SuperCalc*³ lets you plot your chart and then revise your work without leaving the spreadsheet.

With *SuperCalc*³ to combine calculation and graphics, business tools are able

to help out in the laboratory.

Production

Production scheduling constantly balances the expected demand for items in stock against the company's production capacity. With interest rates high, accountants watch the cost of holding inventory closely. A firm, for example, wanted to set up a new inventory control and production scheduling system. With *1-2-3*'s power of analysis and graphics, I reviewed the company's order history. A popular product, for example, averages 300 units

ADVERTISING & SALES General Merchandise Retailing

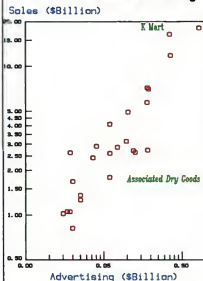


Figure 4: Advertising and Sales. Logarithmic axes provide a second and more powerful view of the competitive advertising levels of specified retailers.

per order. Lotus's *1-2-3* can do more than just calculate averages, however. The *Distribute* command in *1-2-3* allows me to summarize orders by the number of units required for each. Creating the chart is simple, as is exiting *1-2-3* to plot the chart (Figure 6). The short process allowed me to provide the company scheduler with better ammunition to set lot sizes than past methods or simple averages did.

At the same time, reviewing the company's past orders provided help in daily scheduling before the new system was installed. In fact, I uncovered an underly-

CHARTING YOUR COURSE

CELL ANALYSIS

Vespula

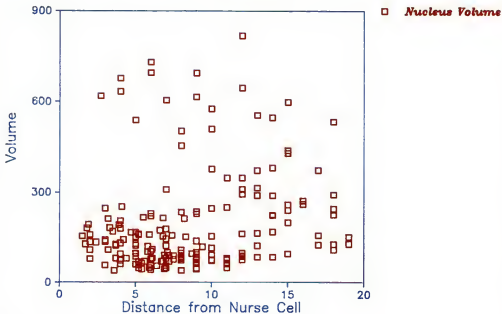


Figure 5: Cell Volume. Combining calculation and graphic capabilities, SuperCalc³ is a valuable tool in the R&D laboratory.

ing assumption that customers who needed only one unit would have to wait for product when supply was low.

Though graphic quality control charts have been used for a long time, using the power of Lotus's 1-2-3 to evaluate and graph a product's order flow keeps production managers ahead of the game.

Administration

A president's report tracks four key variables in business operations: sales, earnings, receivables, and inventories. The usual reports lack visual impact and

contain only a limited historical perspective. Comparisons of this month's results with last year's or the budget usually involve discussions of the comparison's appropriateness. By including a continuous historical perspective, the chart keeps the discussion focused on the task at hand: a constructive appraisal of the course of the business.

Several programs can put more than one chart per page, but all involve some compromises that detract from the chart's effect. *GrafTalk*, which has a command language in addition to its menus, proved

ideally suited for this report (Figure 7). The power of the graphics command language in *GrafTalk* transcends the confines of the menu system to permit creation of the chart.

The operating report features a pair of line charts, a bar chart, and an area chart, all on one sheet. I used a bar chart for the profitability measure (return on sales) as much for added visual weight as for a charting theory. The area chart for inventories is another way to focus attention on inventory.

I based the y axis for each chart at zero

for an honest chart. This crucial element of perspective is missing in charts that truncate the scale to emphasize a "gee-whiz" point. The use of a light-brown scale and bold, black data points lends visual impact to an effective production report; the color choice means decent contrast on the copies too.

Although the *GrafTalk* commands are not particularly daunting, they do involve learning a computer language of sorts.

Although *GrafTalk* commands are not daunting, they do involve learning a computer language of sorts.

You don't need to know the language to run the report and obtain results, but you still must invest time or get help to develop the report (Figure 8).

GrafTalk can read an operating data file and ignore specified characters, fields, and/or observations. Such capabilities suit the program well in a production environment, for cranking out a report each month with little hassle. In this example, I created a separate data file that could be easily updated for new data with the *GrafTalk* spreadsheet. *GrafTalk* also can do many calculations, permitting the initial data of sales, cost of sales, earnings, receivables, and inventories to be transformed into the return on sales (ROS), days sales outstanding (DSO), and inventory turnover (Turns) data that will be charted.

The Operating Report and *GrafTalk* effectively sum up the business's operations.

Bubble Charts

In the mid-seventies, I began using a bubble chart to illustrate the relative positions of businesses in a large corporation. Such a chart includes the traditional *x* and *y*

values and adds a third dimension—the area of the circle, which represents each business. With this concept, I can demonstrate the growth (*x*) and profitability (*y*) of each business and maintain the area of the

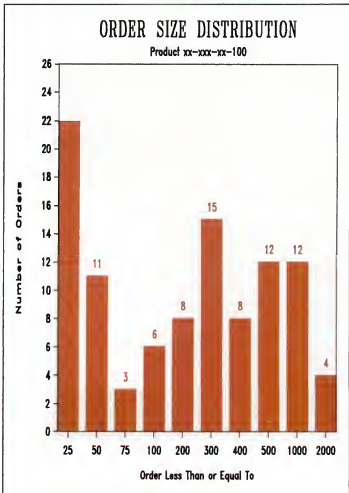


Figure 6: Order Size Distribution. The power of the 1-2-3 spreadsheet to analyze distribution easily is a valuable aid in production scheduling.

CHARTING YOUR COURSE

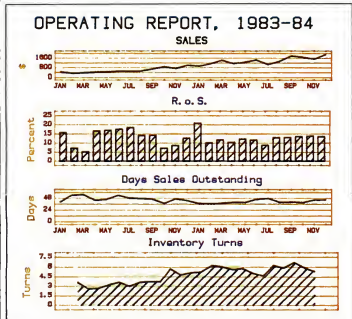


Figure 7: Operating Report 1983-84. GrafTalk combines four separate charts on one page to illustrate the progress of the business.

circle proportional to the assets devoted to the business (Figure 9).

Several years ago a bright member of my staff wrote a custom bubble chart program for our specialty graphics microcomputer. With *Graphwriter*, you need only your PC and a plotter.

Graphwriter is a very powerful graphics program, only recently available in PC-DOS. The full program and extension set includes more than 200 programs and eats up about 3 megabytes of my hard disk (it can be run without a hard disk, which means swapping disks). The menu operation is ideal for someone who does only a few charts or who doesn't want to learn a programming language.

The bubble chart includes several *Graphwriter* options to help communicate

the message. I use the footnotes in the lower left of the chart for more material, including the source of the data, which I find to be a good habit. Explanatory material is essential to a good chart, but few micro packages permit you to include it. *Graphwriter* also provides a comment section (lower right) to add more explanatory power to the chart. I found the options for both sections covered my needs. With the optional baselines, I can use the hurdle rates for the business to differentiate those above from those below. To illustrate, I used the zero values. I used a variety of text sizes, fonts, and colors to illustrate the range of *Graphwriter*. In practice, though, I would use only two colors and styles for another way to draw the viewer's attention to one or more businesses.

```
device Plotter
detafile a:\operreport
erase

reserve bottom 95

MOVE .5 -.5
char color text 2
char size text 1.75
ctext \OPERATING REPORT, 1983-84\

full
char size title 1
char color text 2
char size label .5
char color label 6
char color title 3
y axis erid
reserve left 10
reserve right 10
title \SALES\
y name $
x name Jan 1
reserve top 9
reserve bottom 72
y range 0 2000
plot c1
full

reserve top 29
reserve bottom 48
reserve left 12
reserve right 12
title \R.o.S.\
no x name
no x label
y name Percent
y range 0 25
bar c2
full

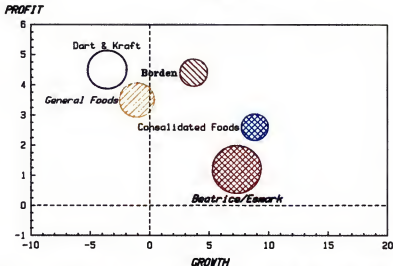
reserve top 55
reserve bottom 24
reserve right 10
reserve left 12
title \Days Sales Outstanding\
y name Days
x name Jan 1
y range 0 60
plot c3
full

reserve top 76
reserve left 11
reserve right 10
title \Inventory Turns\
no x name
no x label
y name Turns
y range 0 7.5
uplot c4
full
```

Figure 8: Operating Report Listing. The program language isn't cumbersome but does require some knowledge to develop and use the command form of GrafTalk.

PROFIT & GROWTH

Selected Food Companies 1983



PROFIT: Return on Sales. GROWTH: Sales & Change
 AREA: Proportional to Assets, 1" = \$10 billion
 Source: *Fortune*, 4/30/84

BISHOP Associates
 2000 Sherman Avenue, Suite 100
 Evanston, IL 60201

Figure 9: Profit and Growth. The area of the circle for each of these companies is proportional to the companies' total assets, adding a third dimension to the chart.

Text that writes over plotted items is a problem when annotations appear on the field of the chart, and it especially affects bubble charts. In my first version of the chart, several legends wrote over sections of the chart. *Graphwriter's* editing facility lets you place the text either inside the bubble or anywhere around the outside.

Graphwriter has two features that will endear it to users with one- or two-pen plotters. It tells you the color it needs next, so you don't have to guess. All lines plotted with one color are drawn at the same

time—a feature you'll appreciate if you have had to swap the same two pens in and out of a plotter for more than 5 minutes.

The bubble chart and *Graphwriter* are two powerful tools in the arsenal of the business professional.

The Bottom Line

Business graphics on a microcomputer are a cost-effective means to personal and business productivity. Though I have yet to find one package that I would be able to recommend as the best for everyone, sev-

eral good software packages are available at reasonable prices. The key is to match your needs to the software's strengths and weaknesses. For about \$2,000 (for software and an inexpensive pen plotter) you have tremendous graphics power right at your fingertips. ■

Jack Bishop is a management consultant based in Evanston, Illinois, and specializing in business operations and planning. The use of business graphics is an important part of his work.

The PCturbo 186™ takes a good computer and makes it the BEST!



Good

PC

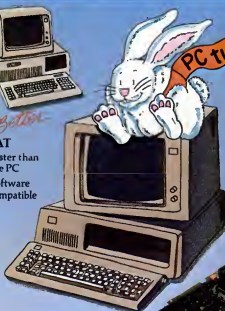
- Vast selection of software



Better

PC AT

- Faster than the PC
- Software compatible



Best!

PC + PCturbo 186

- Faster than the PC
- Total software compatibility
- Automatic Disk Caching
- More affordable than a PC AT
- 80186 works in complement to 8088



**Orchid's
PCturbo 186**

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CIRCLE 412 ON READER SERVICE CARD



SPECIAL REPORT • ROBIN RASKIN AND TOM CHRISTOPHER

PC SYSTEMS FOR PIE CHART PICASSOS

These three business presentation graphics systems can help you become your own high-quality art production house—within certain limits.

By now, it's common knowledge that graphics enhance most business presentations. Just about everyone knows that visual aids make a big difference in communicating such potentially dull material as growth, profits, and marketing trend statistics. What everyone may not know is that 1985 promises to be a big year for the marriage of the PC and presentation graphics systems. The new hardware and software combinations can transform you and your PC into an integrated art department/production house churning out brilliantly colored charts, graphics, and other illustrations at a cost that compares favorably with the thousands of dollars you might spend to produce even one presentation in the conventional manner.

Coming of Age

The unveiling of the IBM PC years ago was immediately followed by a spate of announcements for word processor, database managers, and spreadsheet software packages. These products were available almost immediately because software publishers had already learned the ropes during personal computing's 8-bit infancy. However, until recently there has been a noticeable absence of sophisticated business presentation graphics processors.

Presentation systems have been slower to mature because they have migrated to the PC from the other direction—down from minicomputers and mainframes. Moving an 8-bit version of *WordStar* to the PC is relatively easy because the PC is more powerful than its 8-bit ancestors.

Moving a presentation graphics system from a powerful mainframe to the micro PC is much more of a challenge—it's like trying to manage a Fortune 500 company from your den.

A presentation graphics system is a hardware/software package designed to produce visuals for reports and presentations. Besides the usual software for making bar, line, or pie charts, it contains more complex routines for creating text graphics. Many systems also offer primitive drawing systems so that you can make block diagrams, organizational charts, and so on. A presentation system is not designed to meet the needs of top-flight artists nor the needs of engineers, draftsmen, or architects. Presentation systems can display their drawings in a variety of formats, all of which are intended to complement a formal business presentation.

Presentation systems do go far beyond the graphics capabilities of such programs as 1-2-3, which produce striking visuals on the PC's display screen or printer. Presentation systems can produce a wider range of visuals, and they usually output these visuals to slides or a high-resolution

PIE CHART PICASSOS

monitor. These systems take the PC's display and take steps to enhance the color resolution, correct the geometry, and eliminate the jaggies to create a more perfect graphic.

Of course, if you want slides of PC-created graphs, you can always point a camera at your display screen and take a photograph. This process will capture the basic image, but a business presentation system refines that image considerably.



PictureIt/VideoShow

General Parametrics Corporation
1505 Solano Ave.
Berkeley, CA 94707
(415) 524-3950

List Price: \$595 for *PictureIt*, \$3,499 for *VideoShow*

Requires: 128K, (256K recommended), two double-sided disk drives.

CIRCLE 651 ON READER SERVICE CARD

Presentation Master

Digital Research, Inc.
60 Garden Ct., Box DRI
Monterey, CA 93942
(408) 649-3896

List Price: \$1,995 *DR Draw* and *DR Graph* available separately for \$295 each.

Requires: 256K RAM, IBM Color/Graphics Adapter, DOS 2.0, two double-sided disk drives.

CIRCLE 652 ON READER SERVICE CARD

Genigraphics Series 1000

Genigraphics Corporation
4806 W. Taft Rd.
P.O. Box 591
Liverpool, NY 13088
(315) 451-6600

List Price: \$17,000, \$12,500 for upgrade package without PC.

Requires: Includes PC.

CIRCLE 653 ON READER SERVICE CARD

The difference is striking. In addition to creating a "displayable" graphic as an end product, these presentation systems each contain some mechanism for transcending the PC's graphics limitations.

Truly state-of-the-art graphics is usually done on mainframe and minicomputers, often with exotic display systems, specialized processors, and other paraphernalia. The PC AT is headed in that direction, and it promises to be a much better graphics engine than the current PC or XT.

Currently, however, users must contend with the PC's limited graphics display. The resolution is low, and the colors that can be displayed are abysmally few. Although you can do many interesting things with it, preparing slides remains quite difficult.

Current Crop

The three systems reviewed here all use some external hardware to break the chain to the PC's display. Unfortunately, that strategy also has its drawbacks. Interactive graphics means you see an image as you work on it. None of these systems allows you to do that because they all strive for more quality than the PC can deliver. Thus, you see and work on an image using the PC's display, but you can't see the higher-quality final image until the entire process is completed.

These presentation graphic systems are all usable, but each has a unique set of bothersome intricacies meant to skirt the limitations of the PC. Using these systems, you can produce high-quality visuals in ways that IBM never thought of 3 years ago.

The price and performance of these packages vary so widely as to make comparisons difficult. At \$17,500 (up to \$20,000 with options), the *Genigraphics Series 1000* is a mini electronic paint/draw system that includes a PC on which you design 35mm slides and telecommunicate or transport the information to a Genigra-

phics Production Center for high-resolution slide output. For \$3,890, General Parametrics's *PictureIt* software and accompanying *VideoShow* equipment lets you create and display 25 varieties of formatted business charts on any standard monitor, television, or video screen. Finally, the \$1,995 Digital Research, Inc., (DRI) package (with *DR Draw* and *DR Graph* software and accompanying software/Polaroid image-recording equipment) lets you produce low-cost charts, graphs, and drawings for slide presentation.

GENIGRAPHICS SERIES 1000: A GENIE IN A COMPUTER

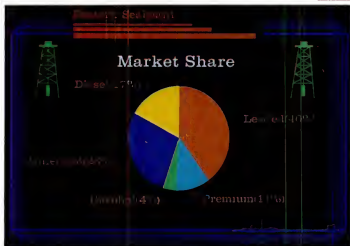
Genigraphics Corporation, although a PC neophyte, has 20 years of experience in the slide-production business. Genigraphics was originally a subsidiary of General Electric Corporation. Its large mainframe and mini systems have a good reputation for producing technically superior, computer-enhanced slides. Since the early 1970s, Genigraphics Service Centers have produced customized slides for walk-in customers at \$50 to \$100 apiece. Tired of being the small peanut to GE's big elephant, Genigraphics set out on its own and entered the micro world.

The *Genigraphics Series 1000*, the company's first micro-based product, is a low-end version of the larger Genigraphics systems. The *Series 1000* operates as a sort of standalone workstation for the high-end Genigraphics system. Using the *Series 1000*, you can create a medium-resolution (480 by 640 pixels) graphic on a PC and communicate it to Genigraphics's Service Network or to in-house Genigraphics machines for enhancements and development. After transmitting your information to the service center (by mail, modem, or in person), you receive a high-resolution Genigraphics color slide within 24 hours.

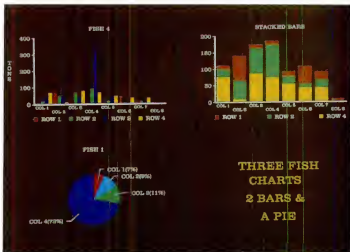
The Genographics system is the sum of many parts; you can customize the equipment in several different ways. Its various components let you create computer-generated graphics, standard graphs and charts, and a variety of text slides. However, three conditions limit its market: it's very expensive, you are forced to rely solely on Genographics's network for processing slides, and slides are the only medium available—if you don't use slides for most of your presentations, the system is of little use.

Genographics took a "Chinese restaurant" approach to building the *Series 1000*—some from column A and plenty from column PC. It started with a 320K IBM PC with a monochrome monitor, a color card, two serial ports, a single 5¼-inch floppy drive, and a 10-megabyte hard disk and then added a medium-resolution color graphics monitor and the Genographics color graphics software. Optional enhancements include a slightly customized Summagraphics digitizer and puck, a Microcom modem, and a communications package. If you already have a PC, Genographics also offers an upgrade system.

The system includes six major software components: Basic Shapes, Graphs and Charts, Symbol Library, Word Slide, Digitized Drawings, and Communications. Combined, the components comprise a full-service slide production facility. The Basic Shapes component creates all kinds of images one shape at a time. The Graph and Chart component generates conventional bar, pie, line, and scatter graphs either from direct input or by transferring data from other DIF files. The Symbol Library supplies more than 100 commonly used graphics icons that can be incorporated in your visuals. The Word Slide program includes nine standard layouts for title slides, tubular slides, and others. The Digitized Drawing module, used with a digitizing tablet, traces in objects such as logos, maps, and other nonregular draw-



This slide illustrates the flexibility of the Genographic system. The oil derricks were pulled from the Genographic symbol library. The boarder comes from the boarder file. In addition, you can piece different type styles anywhere on the slide.



This slide shows samples of the many charts and graphs available with the Genographic system. More than one chart, graph, or other design element can be placed on a single slide overlay.

PIE CHART PICASSOS

ings. Finally, the Communications package transfers specially created metafiles to Genigraphics's Data Collection Service, where they are electronically distributed for high-resolution imaging.

Most of the rudiments of a fine business presentation system are included in the *Series 1000*. The system is comprehensive but compact, requiring a minimum amount of disk shuffling and desk space. The monitor displays color well and has an easy-to-use grid. Any shape can be copied on the display screen or into another visual. You can quickly modify color, line thickness, font, location, and object size. Sixteen colors are available on a working palette, and you can create customized palettes using over 4,000 Genigraphics-supplied colors. The system's response time is reasonable, and the menu-driven directory allows you to easily create a file for a presentation that includes any number of visuals.

Genigraphics attended to the needs of the computer novice as well as the computer-savvy user. The system offers three distinct modes of operation, Fast Track, Power Track, and Power Track Plus, to allow for varying levels of data manipulation. The Fast Track mode simplifies the creation process because it automates many of the system's features. Using the Fast Track, you type data into the system and link it to a particular graph format. The two Power Track modes let expert users manipulate multiple data sets to form a number of different chart formats.

Limitations

Despite its range of capabilities and the high quality of its slide output, the Genigraphics system has serious limitations for the graphics artist. It performs simple object-oriented procedures very well, but it does not facilitate many more complicated graphics procedures for several reasons.

Only medium resolution. The Genigra-

phics medium-resolution screen makes words and letters appear poorly proportioned, jagged, and uneven. While the slide output rectifies the problem, those

For \$17,000, we'd like a tutorial to show us more than the keyboard layout and how to choose a menu item.

who intend to use the monitor to display presentations (at a trade show or booth, for example) may be less than satisfied. Presumably some of IBM's new developments in color monitors may leave the Genigraphics monitor in the dust.

Limited output. Naturally, you'll want to consider how much you rely on slides before you run out and buy this system. A slide show has become a standard business presentation, but other media are always necessary. The Genigraphics software does output to a number of dot matrix printers, pen plotters, and ink jet printers but, for the price, it would be nice if Genigraphics had paid more attention to hard copy. Perhaps it might have considered a phototypesetting connection or a means to create overhead transparencies, two frequently used media.

Out-of-house processing. When it comes to tight schedules, a slide in the hand is definitely worth two at the production house. Buying a Genigraphics system means relying on the Genigraphics network, a phrase that conjures images of nervewracked business executives relying on Federal Express to save their skins. Telecommunications and postal communica-

tions are prone to error. Slides are not easily or quickly corrected if there's a production mistake. When it comes to audiovisual materials, it might be wise to consider keeping things as much in control as possible (although Genigraphics's promise of 24-hour service was, in our case, never broken).

The basic Genigraphics service costs \$7.50 to produce each slide (plus mailing costs). Genigraphics can also enhance your slide—with exploded text titles or twinkling backgrounds—but you pay for this service based on the same fee schedule that any walk-in customer would, artwork in hand. These effects are the Genigraphics forte, and they should be made available to PC system buyers at a special rate.

Rudimentary documentation. Like any good system, the Genigraphics software, to quote the old adage, is "easy to learn but difficult to master." The gap between the learner and the master could be narrowed with better documentation and tutorials. The written documentation is adequate only in its explanation of the fundamental parts of the system. The disk-based tutorial is nothing more than a lesson in simple PC fundamentals. Both ignore the system's more advanced capabilities. For \$17,000 we'd like a tutorial to show us more than the keyboard layout and how to choose a menu item.

Nonetheless, after 15 minutes of the system we were creating simple graphics. That result says good things about the ease of learning Genigraphics's procedures. After running the company's demo disk to see how much artistic sophistication could be achieved, we began searching for clues to doing it ourselves. Looking at the tutorial was a waste of time. Nor does the system include any type of help function. On perusing the manuals, we discovered that Genigraphics left us out in the cold after teaching us only to draw simple shapes. The manual never discusses how

to create commonly used images and effects. Eye-catching drop shadows and exploded text are well within the means of the Genigraphics system, but it's up to you to unravel the mystery. The program's most powerful parts are undocumented secrets.

Noncompatible features. When using the system, you choose between Genigraphics-compatible and noncompatible formats. The Genigraphics-compatible mode confines you to four traditional fonts. It allows only vertical and horizontal movement of shape and text. The noncompatible mode offers a much wider selection of fonts (including a nice italic and Santuri bold) and the ability to vertically rotate text and manipulate full areas as separate shapes. Unfortunately, only the Genigraphics-compatible mode can produce high-resolution slide output. In noncompatible mode, you can only output your slide to your own peripherals. What good is having all the powerful features of the non-compatible mode if you can't use them to create high-resolution slides?

Component confusion. You reference each Genigraphics visual you create as a composite list of individual shapes. Modifying a portion of a visual requires that

The Genigraphics symbol library software is a thoughtful addition.

you remember the size and sequence of the components. You might, for example, draw a snowman (three circles) and then want to modify the size of the base. The shapes list tells you the snowman is composed of three circles. Which one did you draw first? As your drawings get more

complex and time passes, the problem intensifies exponentially.

Ultimately, unless you have a pencil sketch of your step-by-step procedure, it's hard to remember which shape it is you want to modify. When we returned to modify a drawing after a lapse of several days, we couldn't make heads or tails of the 20-item shapes list. It would be helpful if the software walked the cursor through your graphic creation item by item until you could pinpoint which you wanted to modify.

Small symbols library. The Genigraphics symbol library software is a thoughtful addition, although its graphics are artistically primitive. Unfortunately, in compiling these symbols, Genigraphics did not accommodate the business user's frequent use of PERT charts, Gantt charts, data flow diagrams, flow charts, and other applications requiring specialized symbols.

Artistic constraints. Often, an artist's presentation depends on drawing a picture and reorienting it elsewhere on the screen in reverse. The Genigraphics system does not allow you to "flop" or rotate designs. In its Genigraphics-compatible mode, the system can only shrink or stretch objects, copy them, or move them horizontally or vertically. Similarly, you cannot "fill" a shape, remove hidden lines, or draw high-quality arcs and three-dimensional representations. Nor does the system make use of any specialized brush techniques, blending, dotted lines, or patterned fills. These features are all standard ones that graphic artists need.

Nonconventional measurements. Genigraphics uses a nonconventional type size standard instead of the traditional "point" measurements. If you are accustomed to the conventional system, you may find at first that you have no frame of reference for judging the size of your text or shapes. There is no automatic kerning of text.

Limited digitizing. Genigraphics has cus-

tomized a digitizer for its system by laying a Genigraphics acetate grid over a standard Summagraphics tablet. Each time you access a drawing in the digitized mode, you begin by specifying the frame parameters as if you were creating a new graphic.

The digitizer uses a puck to create lines between two points rather than continuous movement, which means you can't do

The Genigraphics system can produce excellent slide presentations but needs refinement and a lower price.

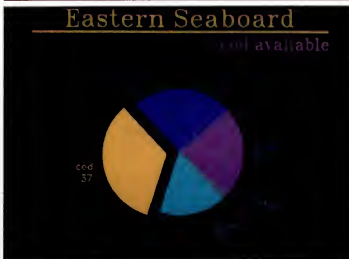
freehand sketching. The *Genigraphics Series 1000's* digitizing capabilities are not like those of sophisticated "paint" or pen-controlled drawing systems. Only fairly primitive shapes can be digitized.

Despite Its Flaws

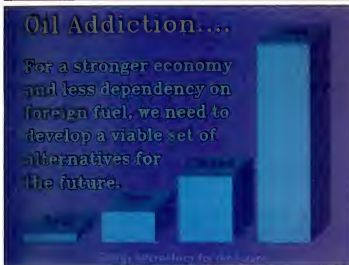
The Genigraphics system has the essentials to produce excellent slide presentations, but the system needs refinement and a lower price tag. As it stands, the system is too complex for the needs of many executives, who may get more for their money by contracting out slide production to Genigraphics or another professional imaging service and leaving the art to the artists. On the other hand, professional artists may feel handcuffed by the software's constraints and opt for a more powerful system. Companies that can afford artists and \$20,000 software can often afford \$60,000 software.

Despite its limitations, the *Genigraph-*

PIE CHART PICASSOS



This pie chart was created with General Parametric's Video Show. It illustrates just one of the system's 25 slide formats.



General Parametric's system produces high-resolution images with good type quality. In addition, you can choose from 1,000 different colors.

ics Series 1000 system is a powerful tool. Our sessions with the system proved that Genigraphics's tradition of high-quality (and high-priced) graphics continues. We found Genigraphics personnel knowledgeable and supportive. The slides we sent out for development were returned on time and the quality was nothing short of perfect.

GENERAL PARAMETRICS

While slides are the prevalent business presentation format, they are difficult to preview, costly to develop, and not easily modified. If you are looking for a dependable presentation alternative to chancy 35mm, General Parametrics's *PictureIt/VideoShow* package could be the one for you. General Parametrics's system produces and displays visually attractive graphs, charts, and text material on a color television, color monitor, or video projector. The price is under \$4,000.

Unfortunately, that price is not the only one you pay. General Parametrics's *PictureIt/VideoShow* limits your artistic creativity by confining you to 25 preset presentation formats. You might say the General Parametrics's system is the "color by number" kit of the graphics presentation world. It offers plenty of colors and beautiful results but only a limited gallery of pictures to choose from.

General Parametrics's *PictureIt/VideoShow* system relies on an IBM PC or compatible with a minimum of 128K and two disk drives. The *PictureIt* software creates the image, and the *VideoShow* hardware/software combination displays it. *PictureIt* guides you step by step through creation of charts, graphs, and word slides. The documentation shows you samples of the 25 common templates from which you select a presentation format to represent your data. The templates include expanded-segment pie charts, line graphs with filled or unfilled areas, overlapped bar

graphs, and framed text areas. Once you display a template, you can create charts by filling in the blanks in a prescribed format. You can exert artistic control by combining and modifying the charts.

Once you've created your graphic, you insert a second disk containing the *VideoShow* operating system and your *PictureIt* file in the portable, 16-pound, *VideoShow* unit. The *VideoShow* unit contains a single disk drive and 256K of RAM. Based on a 16-bit 8086 processor, the unit can display its output to a color monitor, television, or video projector. A 23-button, touch-sensitive keypad or an infrared-based remote control unit allows you to direct the presentation sequence.

Operation

The ensemble is simple to install and even simpler to operate. The results are comparable with those of many higher-priced systems. General Parametrics's Macrovision technology replaces individual pixels with variable groups of microdot units, maximizing resolution and smooth appearance. You can achieve subtle effects by blending and combining colors. The system's variety of crisp, clean colors is phenomenal for its price range.

You can modify any 1 of the 105 colors displayed in the documentation by specifying the amounts of red, green, and blue added to each, for a grand total of 1,000 available colors. If you specify a color by name rather than number, the documentation illustrates complementary colors that work well with your selection. In addition, *PictureIt* lets you choose a background from 20 stylish examples.

The system does make some small allowance for artistic expression. It offers you the choice of long or short format when designing bar, pie, line, and word charts. The short format defaults on items like color and typeface and asks you simply to insert the relevant data. The long format lets you experiment with such

effects as three dimensions, highlighting, shadowing, varied typefaces and sizes, and a palette of mouth-watering colors.

You can immediately preview artwork in progress on your PC monitor. Each template permits you to choose among several different typefaces and sizes and specify text centering or justification.

We inserted the *PictureIt* software in one drive, the *VideoShow* presentation disk in the second, and within 15 minutes, we had created an attractive and colorful exploded pie chart. Next, we transferred the disk into the *VideoShow* display unit and connected it to the computer monitor.

The *VideoShow* remote display device is a big plus that lets a speaker roam freely within a 20-foot area.

The remote control allowed us to display the colorful fruits of our labor while sitting back in comfort.

The *VideoShow* remote display device is a big plus that lets a speaker roam freely within a 20-foot area. Either the remote control or the keypad can select and display any picture at any time, in or out of sequence. Either can direct a pointer to a specific location and build overlays and composites. These sure-fire techniques simplify complicated presentations. You can program the entire presentation to run automatically, directing the machine to insert meaningful pauses when necessary. With this feature, the *VideoShow* system can be used in conjunction with a dubbed sound track.

We found the directory system easy to use and organize. The system creates and maintains a table of contents for each presentation. The picture files are encoded in a subset of the proposed North American Presentation Level Protocol Syntax (NAPLPS) rules for encoding and decoding computer graphics instructions. This may one day make it possible for it to communicate with other graphics machines and devices.

General Parametrics's presentation system has distinct advantages. The display is more cost-effective and hassle-free than a slide presentation. You don't need to send anything out-of-house, thus eliminating one of the presentation maker's greatest fears—the delayed return of graphic material. You can modify a graphic on the spot without having to navigate the complex and expensive photographic process all over again. Generally, the fewer hands that touch a presentation, the better. The *PictureIt/VideoShow* combination lets you keep the production safely at home.

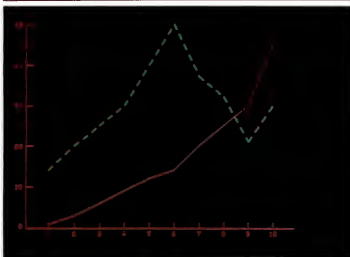
Drawbacks

The system also has some severe drawbacks. Unlike with Genigraphics's *Series 1000*, you cannot use data sets from other programs. Rows of figures you may have spent hours formatting for *VisiCalc*, *1-2-3*, or *Multiplan* must all be tediously typed in again (probably with a few new mistakes).

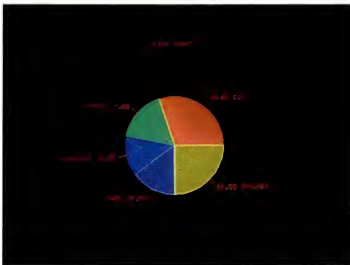
You are limited to the 25 preset formats, which consist only of pie charts, bar charts, line graphs, and all-text visuals. You can say only so much with charts, and you can subject your audience to them only so many times in a given presentation.

We prefer to use slides and not a display screen for formal business presentations. We've never found that television draws attention the way slides do. A darkened room and a film screen are more captivating than a television, which everyone

PIE CHART PICASSOS



This line graph is an example of a customized 35-mm slide created with Digital Research, Inc.'s *Presentation Master* hardware/software combination.



This pie chart is another example of graphics created with the DRI system. Other graphics from DRI include bar charts, stacked bar charts, and plotted line charts.

is accustomed to viewing while doing at least three other things.

Also, although the color monitor is adequate for a small audience, you can't use it in an area larger than a ten-seat conference table. For larger presentations, you need a large-format screen, an extra expense you must budget.

VideoShow and *PictureIt* can save you big money, but they drastically reduce your options. You can't add in a few custom pieces of art to "round out" your presentation, the way you might with a similarly limited slide production system. Also, it lacks a facility for producing formatted organizational charts, Gantt charts, PERT charts, flow charts, circuit diagrams, or scientific notations. Text slides are restricted to eight formats. We found the undocumented procedure for combining formats a nuisance and not worth the effort. The *General Parametrics* system is like a terrific set of paints and an easel that you can use to paint only within specified lines.

DRI's PRESENTATION MASTER: A BARGAIN WITH LIMITS

For an affordable \$1,995, Digital Research, Inc.'s (DRI) *Presentation Master* software/hardware combination (including *DR Draw*, *DR Graph*, and Polaroid imaging equipment) allows you to create customized 35mm slides and Polaroid instant color prints with a PC. DRI has joined forces with Polaroid to offer PC users a complete graphic production facility for under \$2,000. The system even allows you to photograph and develop computer-generated graphics.

Presentation Master eliminates anxiety about transporting artwork to and from photography labs. Instead it substitutes a new anxiety: will your home-brewed slide presentation be adequate when matched against those produced by professionals?

We found it impossible to match the quality of production house slides using DRI's package, but with a bit of fortitude you can achieve very presentable results. Despite the limitations of its on-screen creation process and the idiosyncrasies of its photographic procedure, *Presentation Master* does offer a manageable solution to reducing the high cost of slide shows.

Presentation Master requires a PC or XT with at least 256K RAM and a color/graphics adapter. DRI has another version of the software that takes advantage of more memory.

Considering its price tag, the *Presentation Master* is incredibly comprehensive. However, we found it produced unspectacular results. *DR Draw* and *DR Graph* let you design a variety of computer images on your screen. The presentation component, with its Polaroid image recorder, 35mm Minolta camera, Polaroid instant print autoprocessor, and slide mounter, produces enhanced 3¼-inch by 4¼-inch color prints and 35mm slides of your computer creation, which looks better than what you see on your screen. If you are not an artist, you may have difficulty getting the most from the system; because it uses no frame buffer device, you must rely on your ability to "extrapolate" what the full-color slides will look like based on the PC's medium-resolution, only partially colored screen.

DR Draw

The simple *DR Draw* software system lets you manipulate basic shapes and text to create customized graphics. Its object-oriented approach is a boon to anyone who has struggled with a painting system's more primitive line-orientation. With *Draw*, you can treat "objects" as whole units that you easily rearrange and reorient. Ostensibly, *DR Draw* can be used with either a keyboard or a mouse, but we predict anyone relying on the keyboard will quickly throw the system out the near-

est window. We used the Microsoft mouse with outstanding results.

DR Draw displays a dotted grid on the screen. By marking points on the grid, you can quickly learn to draw basic shapes. The system has some nice touches. You can change the style of the font or fill, view (zoom or pan), scale (size or propor-

DR Draw is intended to create simple visual aids and is quite capable if your chief needs are for simple charts and diagrams.

tion), layout (framing), and the color or grid for any picture.

DR Draw is intended to create simple visual aids and is quite capable if your chief needs are for simple organization charts, flow charts, and syntax diagrams. Complex, customized artwork is much more difficult—we found our four-letter words flowing more smoothly than our drawing.

DR Draw's format is horizontal. While it's possible to create vertical text on a slide, you must go through a long procedure during which you revisit the main menu many times. We only liked about half of the program's 12 fonts. The others created poor visuals because of the "open," spotty spaces in their letters. A more flexible system like that of the Apple Macintosh would allow you to create your own fonts. Also, *DR Draw* offers few special characters; using the system for any application with unique characters or

mathematical equations is difficult.

DR Graph

The *DR Graph* program is also simple, but it's powerful. It lets you easily create bar charts, pie charts, bar/line charts, text slides, scatter graphs, and others. You can incorporate data from other packages such as *1-2-3*, *Multiplan*, or *SuperCalc* with a simple menu selection. By selecting the type of graph you want from a menu, you call a template to the screen. Each template lets you edit certain features of your drawing to customize your graph. For example, you can explode a section of a pie chart, select the line style of a line graph, and choose the line width of a curve graph. You can create legends, change fills and line thicknesses, and combine more than one graph on the same slide. Each template maximizes the best features of each graph, automatically eliminating some of the visual "brain" work.

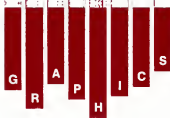
You don't get many fancy graphic techniques with *DR Draw* or *Graph*. You can't rotate designs or create exploded or shadowed text.

DR Graph is supposed to produce text slides, but you can't use it to create a simple bullet. A filled-in letter *o* is the best you can do.

While they offer many overlapping capabilities, *DR Draw* and *DR Graph* each have different limitations. For example, *DR Draw* allows you to select among 12 fonts, while *DR Graph* offers only 4. You can change the thickness of a line with *DR Graph*, but not with *DR Draw*.

Worst of all, you can't combine *DR Draw* and *DR Graph* at all: drawing a bar graph that contains your customized logo or some hand-drawn touch is impossible. You'll wind up making endless mental lists of which piece of software has which attributes. It would be preferable if the two were more integrated.

With *DR Graph* you can easily create a slide in 15 minutes. The annotated graph



PIE CHART PICASSOS

selections gives you great freedom to play with the final look of the graph. *DR Draw* is slower and more frustrating to use. You can't take shortcuts through the system's menu. You must trudge back to the main menu for each drawing modification.

Both *DR Draw* and *DR Graph*'s simple menu directories make selecting and moving visible shapes easy, but *DR Draw* is painfully slow when it draws arcs or circles on your screen. The mouse or keyboard records your strokes point to point: you can't do any free-hand sketching or fine tracking. Such graphics as maps, logos, and cartoon symbols are difficult to create.

Production

You have three options for photographing your graphics: Polaroid print film, Polaroid slide film, and other DRI-specified slide films. We tried all three. The Polaroid instant prints were rather crude. We can't imagine why anyone would ever want to include a Polaroid print as a part of a formal presentation. If the print is intended to give you a "preview" of the slide, you'll have to develop an imagination to use it. Polaroid film has a well-deserved reputation for more dense and muted colors than other film stocks. The colors on our Polaroid snaps were so dense and muted they were almost nonexistent.

We had better luck with the Polaroid slide equipment and produced many adequate—if not snazzy—slides. Again, we were thwarted by Polaroid slide film's dense and muted look. Finally, on the advice of DRI, we began using Fuji-chrome film and sending it out for processing. The results improved significantly. Terrific! The only way to get really good slides is to send them out again!

The rule of thumb? If you need fast slides, use Polaroid's developing process. If you can spare the time, take your film out for developing. Fortunately, the cost

of developing a roll of film is minimal compared to the cost of custom-created slides from a production house.

While the *Presentation Master* system boasts 72 colors, it is only possible to use 8 on a single slide. Because the IBM color card lets you display only one of IBM's color sets at a time, you can only view 4 colors. You can't preview a slide in color. This limitation is the fault of the PC rather

You can use the Presentation Master system to photograph the display generated by any software package.

than of Digital Research's software, but it's a limitation nonetheless. You need a terrific visual imagination to figure out what your slide will look like in full color. Even the documentation's color map is of little help: colors that appear pleasing in the manual are often disappointing when photographed.

One interesting feature to keep an eye on is DRI's inclusion of GSX processing. The graphics system extension (GSX) software expands the PC-DOS environment to include graphics programming and may eventually become the basis for PC graphics standardization. However, the system is troubled because you must reload GSX into memory each time you start up the software. Since GSX is memory consuming, DRI should have included the GSX command in the booting procedure (or instructed you to do so).

Presentation Master forces you to cultivate a passion for photographic trial and error. You'll need a good eye to judge the transformation of screen graphics to slide format. Luckily, you won't have to tinker too much with the mechanical components. Polaroid's paraphernalia works well. A carefully organized PMTUTOR disk tutorial walks you through the production process. In a nutshell, the recorder is connected to your computer's communication port and the video output jack on the color card. The rest is a series of manageable steps. You install the print holder, learn to load two kinds of film, read up on the camera back and autowinder, and attach them to each other and to the image recorder. Once you've got the ensemble together, it's easy to calibrate the exposure of the image recorder.

In addition to PMTUTOR, the presentation software includes four programs: PMTEST to make certain you've met *Presentation Master*'s requirements; SETCAM, which specifies the type of photography work you are doing and makes last-minute color changes; PSAVER, which lets you save an image on your monitor (including images made with other software packages); and PPRINT, which lets you photograph the image saved by PSAVER.

We certainly appreciate DRI's attention to options. You can use the *Presentation Master* system to photograph the display generated by any software package. If you use a lot of screen shots in your presentations, this ability is invaluable. But keep in mind that the quality of photographed non-*DR Draw* or *DR Graph* materials will be inferior to the rest of your presentation, since the DRI software doesn't enhance it.

The hardware end of the process has been cleverly idiotproofed; it's the output that's subject to a lifetime of trial and error. You can, however, compensate for your more-than-likely initial mistakes. For

"I need relief from software-phobia!"

example, you can go into the PPRINT program and change the raster fill to decrease or increase the visual intensity. You can recalibrate your image recorder or try a different type of film. Certainly, with a bit of stick-to-it-iveness you can produce perfectly presentable slides.

Gripes

Our gripes about the documentation for this system are many. It fails to hold that middle ground between the elementary and the technical. The tone is uneven. The documentation comes in three separate books, with three separate indexes. An overall index is sorely needed.

If we were to judge the quality of the graphics from the examples included in the documentation, we'd never touch the system. Unimaginative and inferior, they are filled with barely visible lines, all-but-obliterated reds, poor resolution, and boxy, uneven-looking fonts. It seems apparent that DRI's own people never got good results from the system.

Presentation Master deserves a mixed review. A presentation package that costs only \$1,995 is certainly a boon. It accommodates many film types, it can photograph different software displays, and it can customize colors and fills for a wide variety of graphs and drawings. The problem is that the final output often falls short of the mark. But although graphic artists shudder when we show them the system's output, many business people view it as a long overdue saviour. We know one author who is using the *DR Draw* software to create syntax diagrams for a book on programming languages. The system is certainly adequate for drawing simple boxes and lines.

To us, the Digital Research system is penny wise and pound foolish. Producing slides in-house is certainly cheaper, but if you depend on slides to show your impeccable taste as well as your profit margin, you'll want to look elsewhere. ■

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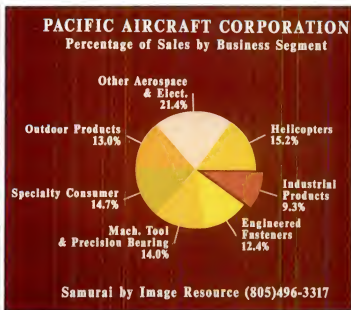
CIRCLE 101 ON READER SERVICE CARD

SPECIAL REPORT • DIANE BURNS AND S. VENIT

SAMURAI IMAGE PROCESSOR

Samurai uses software, a graphics card, and a film recorder to produce high-quality slides of computer graphics quickly and cheaply.

Installing a new graphics package on your PC always brings an initial thrill. Inevitably, however, the disappointment of seeing that the final output still looks like computer output soon follows. The jagged edges and stair-step curves seem a permanent part of your PC's output. But Image Resource Corporation's new Samurai Presentation Graphics System finally makes it possible to produce crisp, clean graphics in beautiful



A pie chart showing percentage of sales by business segment and created with Samurai's IMAGE / software. The package also produces title charts, word charts, column charts, bar charts and line graphs.

SAMURAI

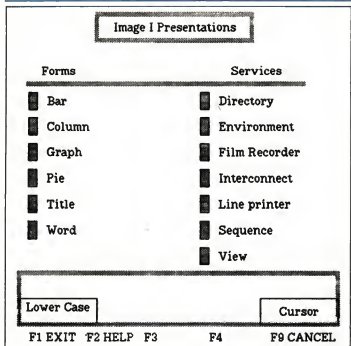


Figure 1: The IMAGE 1 opening menu. IMAGE 1 is an easy-to-use software package for creating business graphs and charts.

colors. Image Resource says it named the Package Samurai to conjure up images of skill, precision, and the cutting edge—appropriate because the system “cuts the jaggies” to produce sharper lines and curves.

Samurai is a desktop graphics PC peripheral that produces high-resolution slides or can output its images to a variety of dot matrix and color printers. Slide resolution is 4,000 lines per inch—extremely high for a system priced under \$10,000. Samurai achieves this breakthrough using an innovative imaging process and special software that makes use of device-independent graphics standards.

The Samurai system combines hard-

ware and software. The hardware consists of a graphics processor board that plugs into an expansion slot, 10 feet of shielded multiconductor cable, and a self-contained 35mm film recorder unit. The software side includes a proprietary protocol language, SIGHT, which provides a common graphics input format, and device drivers that translate SIGHT images into the appropriate output formats to drive several output devices, including the film recorder. Image Resource also offers a business graphics package called *IMAGE 1*, which provides an easy-to-master format into which anyone can input data to create presentation charts and graphs.

We reviewed a prototype model; we

had to load our camera manually, but it performed automatically once we got the film properly mounted inside. According to Image Resource, the final production cameras will be totally automatic. The software we used was in its last prerelease version; the final release version is not expected to be significantly different.

Samurai is easy to set up. Anyone who has ever installed a card in an expansion slot can have the system up and running in no time. Unfortunately, our unit's graphics card was too long to fit into our Compaq Plus without a slight bow. We didn't notice it until the power supply blew up. After we removed the support bracket for the slot to make more room and replaced the power supply, the system performed flawlessly. Image Resource assured us that the cards shipped with the final production units will be the proper length.

IMAGE 1

Samurai produces business graphics through the use of the *IMAGE 1* software package. *IMAGE 1* allows you to input data to produce title charts, word charts, pie charts, column charts, bar charts, and line graphs. Once you define a chart, you can output it to a printer or to the film recorder to produce slides with the press of a single key. On-line, context-sensitive



Samurai Presentation Graphics System

Image Resource Corporation
733 Lakefield Rd.
Westlake Village, CA 91361
(805) 496-3317

List Price: \$9,850 for Samurai System (including film recorder, graphics processor board, and graphics utilities software); \$490 for *IMAGE 1* software. Requires: 256K RAM, two DSDD floppy drives.

CIRCLE 656 ON READER SERVICE CARD

Chart Name: CARS-G1
 Type Style: ROMAN
 Character Type: BOLD
 Palette Number: 15D
 Title: PASSENGER CARS SOLD IN THE U.S.
 Justify: CENTER
 Subtitle: (In thousands)
 Justify: CENTER
 Note: Samurai by Image Resource (805)498-3317
 Justify: CENTER
 Position: BOTTOM
 X-Axis Label:
 Justify: CENTER
 Axis Line: UNDER
 X Axis Data Type: LABEL
 Rulings: NO
 Values Min: 0
 Values Max: 0
 X-Axis Offset: 0
 Show Scale at Axis: YES
 Y-Axis Label:
 Justify: CENTER
 Axis Line: BOTH
 Rulings: YES
 Values Min: 0
 Values Max: 0
 Y-Axis Offset: 0
 Show Scale at Axis: YES
 Linear Scale: YES
 Plot Type: LINE
 Stacked Plots: YES

External File Name:
 Number of Plots: 4
 Number of Points per Plot: 5
 Show Legend: YES
 Plot 1 Legend: U.S.
 Plot 2 Legend: JAPAN
 Plot 3 Legend: CANADA
 Plot 4 Legend: EUROPE
 Increment 1 Label: 1967
 U.S. Value: 7,437
 JAPAN Value: 70
 CANADA Value: 324
 EUROPE Value: 627
 Increment 2 Label: 1970
 U.S. Value: 6,547
 JAPAN Value: 361
 CANADA Value: 693
 EUROPE Value: 939
 Increment 3 Label: 1973
 U.S. Value: 9,666
 JAPAN Value: 624
 CANADA Value: 872
 EUROPE Value: 941
 Increment 4 Label: 1976
 U.S. Value: 8,500
 JAPAN Value: 1,129
 CANADA Value: 826
 EUROPE Value: 582
 Increment 5 Label: 1979
 U.S. Value: 8,418
 JAPAN Value: 1,617
 CANADA Value: 677
 EUROPE Value: 711

Figure 2: The IMAGE 1 specification form allows you to input the characteristics you want your chart to have.

help is available from any point in the program.

The opening menu displays two columns of selections (see Figure 1). The first column lists the different kinds of charts that the system can create. To create a chart, you first select the type of chart you wish to generate. The system then presents you with a fill-in-the-blank screen, which allows you to input the characteristics you want the chart to have, including the type font, the title, the number of data points to be graphed, and the legend and value for each point (see Figure 2). You don't have to learn cumbersome commands or remember the responses for fonts or legend placement—pressing the space bar displays your options one by one. When the option you want appears, you simply press the Enter key to go to the next field. Once the chart is saved to disk, the system returns you to the opening menu where you can choose from a variety of "services."

(continued)

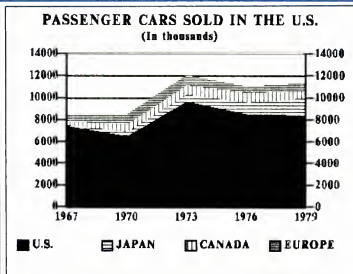


Figure 3: The chart described in Figure 2 as output to an Epson MX-100 printer.



SAMURAI

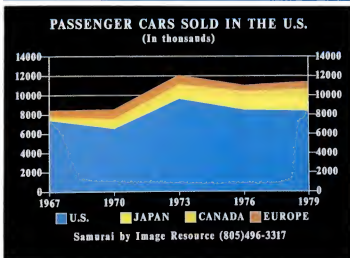


Figure 4: The image shown above is a slide made from the chart described in Figure 2 and produced with the Samurai film recorder.



Figure 5: An image created with a SIGHT file written in ASCII and converted to a packed-hex format using the Sitex Conversion Utility.

Service options include viewing a chart on the screen or outputting the chart to a printer (see Figure 3) or to the film recorder (see Figure 4). The screen does not show colors but represents different colors with various cross-hatching patterns. The system comes with a selection of over two dozen color palettes. Other options include a telecommunications mode and the ability to create a sequence of files to be printed in succession. You can create a sequence list of all the charts for a presentation and have them printed in order. While you're out getting coffee, the system will record all your slides on film and have them ready to develop when you get back.

Unfortunately, you cannot continue working while the system prints a chart to a printer or to the film recorder. It took an average of 7 minutes each to print our charts—a long time to be nonproductive. Supposedly, the production version of the film recorder will make slides in half that time, but that remains to be seen.

SIGHT Files

Samurai's film recorder is able to produce extremely high-resolution slides from *IMAGE 1* because it translates the image into a basic picture file using the Slide Image and Graphics Hardcopy Transmission (SIGHT) protocol language. SIGHT is a language based on ANSI-GKS (Graphics Kernel System) standards with NAPLPS (North American Presentation Level Protocol Syntax) coding. By using what are, I hope, becoming industry-wide standards, SIGHT provides device-independent graphic instructions. Device independence means portability, and, in the case of Samurai, it means the software will accept a variety of input sources and can output the graphic image to a variety of devices.

The SIGHT protocol defines each graphic image in device- and resolution-independent primitives (lines, rectangles,

polygons) and their attributes (color, texture, width, and so on). This language allows the transmission of images over communications lines from mainframe computers, graphics service centers, and other Samurai workstations (see sidebar, "SIGHT: How Samurai Sees").

According to Image Resource, several manufacturers are developing software to interface directly with Samurai. These manufacturers include Integrated Software Systems Corporation (maker of *Tel-lagraf* and *DISSPLA*), Precision Visuals, and Graphics Software Systems. Once these programs are developed, Samurai will become a valuable addition to the graphics departments of organizations using larger computers. The slides in Figures 5 and 6 were written and coded directly in SIGHT by Image Resource.

Eventually, SIGHT will allow a wide variety of devices to "talk" to the Samurai film recorder and various printers. As of now, however, input is limited to files created with *IMAGE I*, unless you want to code SIGHT files directly.

External Files

In addition to manual data entry, Samurai lets you designate an external file when describing a chart. This means you can input data from spreadsheet programs. The process is cumbersome since you must manually input the cell address for each data point—there is no shorthand for entering ranges of cells. We were unable to test this feature because the system failed when we tried to view a file created from an external file. According to Image Resource, this bug has been corrected in the newest version of the software.

The Film Recorder

Samurai's film recorder is a desktop unit that connects to the Samurai graphics card installed in your PC. The unit weighs approximately 50 pounds and measures 16 inches by 22 inches by 9 inches. The film

camera, which accepts standard 35mm film, is attached to the unit.

The film recorder uses a technique licensed exclusively to Image Resource by

Samurai will accept a variety of input sources and can output the graphic image to a variety of devices.

Edsun Laboratories. Rather than merely softening the jagged edges common to computer graphics, it eliminates them. A slow-scan video beam traces the photographic image, reads the SIGHT primi-

tives, and translates them into a matrix of 2,048 by 1,366 pixels. The image is then allowed to "slip and slide" along the scan line, resulting in final output with 4,096 horizontal recording points. The process produces images with virtually no staircase patterns, or "jaggies."

The film recorder also adjusts for possible optical distortions. It uses linear and geometric corrections to ensure that squares have true right angles and that circles are round.

The Big Picture

Market statistics indicate about 520 million camera slides were developed for businesses in 1983, a tab of some \$3 billion. For businesses that "farm out" the production of presentation slides, the cost per slide runs from \$40 to \$300. At under \$10,000, Samurai offers a significantly short payback period for companies that rely heavily on slides for their presentations.

(continued)



Figure 6: Another image created with a SIGHT file by the same process used to create the image in Figure 5.



SAMURAI

SIGHT: How Samurai Sees—and Describes—an Image

With its edge-processing algorithms, the SIGHT graphics language allows Samurai to produce clean, sharp images of the charts you program into it.

The Samurai film recorder, your display screen, and your printer are all able to see the graphic images you produce because they share a common language called Slide Image Graphics Hardcopy Transmission (SIGHT), a proprietary graphics language and protocol developed by Image Resource Corporation. When a SIGHT file goes to the Samurai film recorder, edge-processing algorithms smooth the edges to produce a slide with razor-sharp lines.

SIGHT provides a complete description of an image. The SIGHT protocol defines each image in resolution-independent primitives. The description includes attributes of the image elements (color, font, size, line style) as well as descriptions of the elements themselves (box, line, arc, polygon).

SIGHT is structured according to the NAPLPS (North American Presentation Level Protocol and Syntax) format. The described graphics primitives can be written in ASCII, but must be converted into a 7-bit, "packed-hex" format. Samurai's Sitex Conversion Utility performs these conversions.

The commands in SIGHT fall into five major categories: mode switches, picture descriptions, attribute descrip-

tions, text strings, and macros. SIGHT commands and arguments are encoded into the 7 least-significant bits of a byte, as in NAPLPS. While graphics are the default mode, a typical SIGHT file will contain several mode switches (a dot indicates the command and argument bytes):

```
//START
//MODE CONTROL
.
.
.
//MODE GRAPHICS
.
.
.
//MODE ASCII
.
.
.
//MODE CONTROL
.
.
.
//END
```

//MODE CONTROL invokes the Attributes and Control set to describe color, size, and so on; //MODE GRAPHICS describes the element with the preceding attributes, such as a box or a polygon. Ending the file with the sequence //MODE CONTROL //END

tells SIGHT that the image description is complete. The following is a short example of a file that can be used by SIGHT to display a graphic image.

```
//START
//MODE CONTROL
//SEL PALETTE 20
//FILL 5
//MODE GRAPHICS
//ABS ARC .5 .666 .5 .001 .6
.666
//SINGLE CONTROL
//FILL 62
//ABS ARC .5 .666 .5 .100 .5
.566
//MODE CONTROL
//END
```

This file first selects palette 20, then selects color 5 of that palette as the fill color, and then draws a circle in the middle of the screen (an arc with two identical end points). The file ends by designating color 62 as the fill color for a smaller circle drawn with the arc command. The smaller circle cuts a hole in the larger circle, letting the background show through. The result is a ring the color of number 5 from palette 20 against a background of color 0. —D.B.

Samurai will no doubt prove to be a dream-come-true for many graphic production departments. The product is, however, currently limited to a specific range of charts and graphs. The planned introduction of a digitizing pad will be a welcome addition, as few people will be willing to code directly in the SIGHT language.

Samurai's competition is mostly from products that differ slightly in cost and capabilities. Video Show, for example, costs much less but does not offer high-resolution slide production (or, for that matter, any slide production). Matrix Corporation's Portable Color Recorder will offer more bells and whistles than Samurai

does, but at a higher price.

Samurai delivers good value for its price. It is one of the first packages to offer truly high-quality slide production at a reasonable cost. But the competition is growing—thus making higher-quality graphics available to a wider range of businesses than ever before. ■

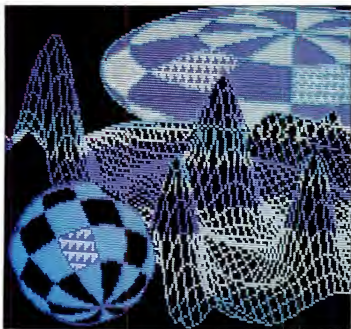
SPECIAL REPORT • JOHN FOWLER

PC GRAPHICS CHALLENGE THE MIGHTY CRAY

Is it possible for a mere PC to match the graphics capabilities of the great and powerful Cray, given enough time, memory, and the right software?

I have a recurring dream. George Lucas is on the phone asking me to do the graphics programming for his next space adventure. I can have anything I want.

"Well, George," I say, "I'll need at least 4 hours a day of Cray time, a fast link to a $1,024 \times 1,024 \times 256$ color display terminal, and a microfilm recorder modified for 70mm color film." Asleep or awake, this is my dream system.



A detail of *Ball, Net, and Frisbee* by John Fowler, created on a standard PC.



CHALLENGING THE CRAY

Then the alarm rings, and as visions of Hollywood fade, my sleepy eyes focus on a familiar gray IBM PC with DOS 2.0, color/graphics card, color monitor, and 2¼-inch square camera. This is my real-world system.

I lie back and dream some more. How close to state-of-the-art can a standard PC come?

Comparing a PC to a modern supercomputer is like comparing Davy Crockett's musket to the firepower of the USS New Jersey. But each has its place; it's a bit much to take a battleship to shoot a bear.

For instance, if I had a meeting in 30 minutes and quickly needed one more pie chart to top off my presentation, I would prefer a PC with a color dot matrix printer to a terminal tied via modem to a huge number cruncher several miles away. There's no way I'd get color graphics out of a supercomputer in 30 minutes.

Supercomputers are, by definition, the most capable computing machines at any given time. There are only a few dozen of them in the world, and most are operated by government agencies such as the Weather Service, the Defense Department, and the national laboratories. They are used for the most complex computational tasks known, including cryptography, complex physical processes like explosions and aerodynamics, and predicting tomorrow's weather. Right now, the machines built by Cray Research, Inc., among others, compete for the title.

The largest prime number, over 25,000 digits long, was recently found by a Cray running a program on background priority during a short gap between regular jobs. A background priority program waits in the background at several installations and runs for a few seconds now and then when the machine momentarily has nothing else to do. Over the months, these seconds add up. In this case, it took about 600 hours to find the prime.

What About Big Blue?

You might have expected the most superior computer in the world to wear a familiar IBM label, but Big Blue abandoned the supercomputing scene in the late 1950s.

IBM had assigned a team to build a computer a hundred times faster than the IBM 704, the fastest existing machine. The result was the 7030. Like all supercomputers, it was, at the time, state-of-the-art. In fact, it turned out to be just a step beyond; it cost IBM more than it returned. About the only thing IBM doesn't do well is lose money.

Control Data Corporation built the next supercomputer to arrive on the scene, the

The first Cray lacked an operating system, I/O, and other refinements that link a computer to its users.

CDC 6600. It was followed closely by the CDC 7600, the supercomputer of the 1970s. Seymour Cray designed it; he then left Control Data to form his own company, Cray Research, Inc.

The first Cray machine, a Cray-1, was installed in the Central Computing Facility at the Los Alamos National Laboratory late in the winter of 1976. Rumor had preceded its arrival, and a small crowd was on hand to watch as the computer was removed from the back of a commercial moving truck.

Seen from above, the machine resembled a C or a circle with a segment removed, leaving just enough room for a

technician, perhaps, to squeeze in for repairs. From the outside, it resembled a column with a row of benchlike boxes along the bottom to hold the machine's power supplies.

That very first Cray lacked an operating system, I/O, and other refinements that link a computer to its users. None of these systems had yet been developed for this new machine. A computer with no I/O is a pitiful thing, indeed, but this was the fastest pitiful thing anyone had ever seen.

A customary measure of a computer's speed is the rate at which it can perform floating-point operations, which involve combining two floating-point numbers (analogous to double-precision numbers on the PC) by an arithmetic operation such as multiplication. A million floating-point operations per second equal one megaflop. The Cray-1 can work at a rate of between 20 and 100 megaflops, performing several dozen million floating-point calculations every second. The PC runs at a rate of about 300 flops, or .0003 megaflops.

There are several reasons why it can sustain such amazing calculational speeds. Its system clock ticks away at 80 million times per second, about 17 times as fast as the PC's. Since it uses a 64-bit word (compared to the PC's 16-bit word), each operation takes in and processes more bits. And its architecture allows it to perform many calculations in parallel. This capability distinguishes current supercomputers from their sequential predecessors.

The Cray-1's size and shape are the result of a trade-off with nature. The clock speed, and thus the megaflop rate, is limited by how fast an electrical impulse can travel from one part of the machine to another. This limits the computer's maximum size to roughly the distance a signal can travel in one clock cycle, about a third of the distance a light beam would travel in space during the same time interval. The machine's minimum size is determined by

the need to carry off the heat its 300,000 integrated circuits generate. The Cray-1 is both the largest and the smallest possible configuration that can accommodate the speed of light as well as heat-removal restrictions.

Incidental Graphics

The graphics uses of calculating giants like the Cray-1 arose out of the need to display the prodigious amounts of data these computers generate in a form comprehensible to people. This entirely incidental use of graphics on supercomputers is gradually being supplemented by machines primarily dedicated to graphics as the movie and graphic arts industries, motivated by the realism available with modern graphics techniques, move into computing.

Real-time graphics (the type you see in a video arcade) are practically nonexistent and difficult to implement on Crays because these machines are generally time-shared. During a normal working day, a Cray-1 can have several hundred users in its input queue at any given time. It can take from a few milliseconds to a minute for it to respond, depending on how many large jobs are running and how the system is configured.

Users at any large computing facility have access to several types of graphics devices. The program that generates the graphics usually doesn't communicate directly with any of these devices. Instead, the main program writes the graphics output to a file that is stored on a mass storage device such as a magnetic disk. Then a separate driver program accesses the graphics file and sends out data in a form understandable to the appropriate graphics device.

This two-step process greatly increases the system's versatility. The user can display the image on any of a number of graphics devices at any time that is convenient or even retrieve the file months later.

But the complexity of the process impedes the development of real-time interactivity and animation.

Among the graphics devices available to the supercomputer artist, Computer Output on Microfilm (COM) machines are the best because of their resolution and color capabilities. Some of these COM machines provide 256 intensity levels of each of the three primary colors (red, green, and blue) with linear resolution equal to that of 35mm color film.

The picture *Chaos* by Melvin L. Pruett (Figure 1) was realized on an Information International Inc. FR 80 COM machine. He created the frame on a Cray-1 using a resolution of 750 scan lines with 1,000 points per line. Each of the 3 primary colors was coded in 64 discrete intensity levels, resulting in a range of more than 262,000 different colors. The program that created the image took about 2 seconds of Cray time.

Two Kinds of Artists

To compare supercomputer art to the graphics produced by the PC, it helps to understand the techniques computer artists use. Techniques vary among computer artists, depending upon background and training. Those who started out as programmers and have moved into art bring a different approach to the discipline of computer graphics than traditionally trained artists who have adopted the computer as their medium of expression.

Perhaps the greatest difference between these two groups is evident in the process of model creation. How does the person sitting at the terminal specify the shapes that comprise the desired image? Artists with analytical backgrounds tend to express shapes in terms of mathematical formulas, since this is the natural means of expression in most high-level programming languages. This approach restricts the artist considerably, since most natural objects are far too complicated topologi-

cally to be expressed by equations.

Artists with formal artistic training but little education in mathematics approach the medium differently. They might specify a few points on the screen (relative to the millions possible) and a set of patterns or textures to fill the boundaries determined by the points. They often rely on

Artists who started out as programmers bring a different approach to computer graphics than traditionally trained artists.

utilities written by professional programmers to complete the picture. Real-time interactivity is probably more important to this group.

Both kinds of artists usually have the same general goal: to specify a group of objects in space. A problem in perspective that they share involves the masking of some objects by others in a drawing and the subsequent removing of hidden surfaces. There are several solutions to this problem, ranging from quick and dirty to elegant. The method used most often, the z-buffer or depth buffer algorithm, lies somewhere between these extremes and works quite well to determine which portions of a set of objects can be seen from a given perspective. It requires extensive computational and memory resources. A location in memory is assigned to each picture element (pixel) on the display. This memory location will hold the current distance from the viewer position to whatever

CHALLENGING THE CRAY



Figure 1: *Chaos*, by Melvin L. Pruett of Los Alamos National Laboratory, was created on a Cray-1.



Figure 2: *Ball, Net, and Frisbee*, by John Fowler, shows the medium-resolution graphics capabilities of the PC.

point the pixel now displays.

If the display holds, for example, 1,000 \times 750 pixels, the z-buffer can be an array dimensioned 1,000 \times 750. The elements of the array are initialized to the largest number possible, corresponding to a distance further away than the furthest article you're going to draw. As the program goes through each object in the scene, calculating the projections of points on the object onto the display, it checks the z-buffer to compare the distance from the view position to the current point. If the current distance is greater than the distance stored in the z-buffer, the point is farther away than the point already plotted at this location and hence is hidden. If the current point's distance is less, it is visible; the z-buffer is updated with the new distance and the point is plotted or placed in a frame buffer.

It's actually a little more complicated than this. For resolutions of which modern film recorders are capable, a z-buffer would require about 4,096 \times 4,096, or 16 million, words of memory. Most machines lack such extensive memory capabilities. Although it is a time-consuming alternative, it is possible to write portions to disk and retrieve them as necessary. A more frequently used approach is to make the frame one part at a time, saving memory at the expense of calculation time. The program can scan across the image one line at a time, much like the scan lines on a video monitor. This approach requires a z-buffer only as large as the number of resolvable points on a scan line. Various programming tricks can recover some of the extended computation time.

These are various ways of specifying colors on an output device. The most general method—specifying independent intensities of the three primary colors—can create the widest range of colors. A realistic picture requires from 32 to 256 levels of red, green, and blue, independently specified, and from 5 bits to 8 bits times

three colors per pixel. Using 8 bits per pixel implies a total of $256 \times 256 \times 256$, or about 16.8 million, possible color combinations.

A more memory-efficient but less general method of coloring relies on a lookup table that maps each color number into a predetermined color. Such a system typically offers 256 colors out of a total of 16.8 million by mapping each color byte into 3 bytes of output.

How the PC Compares

With an understanding of supercomputer art, we can consider the relative capabilities of the PC. I created *Ball, Net, and Frisbee* with a PC and the BASICA interpreter supplied with DOS 2.0 (see Figure 2). Making the image took about an hour of PC time; I then photographed it from a direct drive RGB monitor. The picture's resolution is 320×200 pixels by four colors.

I accomplished hidden surface removal with techniques that are much less general than the z-buffer algorithm. Hidden lines are detected in the wire-frame "net" fig-

A realistic picture requires from 32 to 256 levels of red, green, and blue.

ure by keeping a pair of arrays updated with the perimeter (upper and lower boundary) points on the net as it is drawn, and by drawing front to back. If a given point lies inside the perimeter, it is hidden; otherwise it is visible and the program draws the point and updates the perimeter array.

I masked one object with another by drawing the rearmost object first and then

drawing in the perimeter of the next nearest object. Next, through a series of PAINT commands, I removed portions of the background that are contained in the perimeter of the current object. Finally I drew in the current object. I repeated this process until I had drawn all the objects. This method obviously works only with erasable displays and for nonoverlapping objects.

The main discernible difference between images created on a PC and those created by a supercomputer, artistic quality aside, is the capability the big machines offer for sophisticated shading and surface texturing. Both of these capabilities relate directly to the ability to specify a wide range of hues and saturations of the three primary colors.

Given enough time and memory, you could create a graphics output file with a PC that was identical to a file that the microfilm recorder used to make the Cray-produced frame shown in Figure 1. The task would be reduced to finding a microfilm machine or high-resolution graphics terminal on which to realize the image.

How much time would a PC need? A common method of comparing different machines is to run a benchmark program on each of them. Benchmarks that have been run on both of these machines are uncommon, but the few which are available suggest that 1 second of Cray time compares to about 10 hours of PC time using the BASIC interpreter or about 10 minutes of PC time using a compiled language such as BASIC, Pascal, or C. These are rough estimates, but they suggest that in terms of speed, a compiled program on a PC, especially one that uses the 8087 floating-point processor, can create supercomputer-type images in a reasonable amount of time.

How much memory would be required? To create a z-buffer, you'd need at least 16, and preferably 32, bits of memory for each pixel on the display. Using a

modest 640×400 pixel display, this would require from 512K to 1 megabyte for the z-buffer. This amount of memory pushes the capabilities of most PCs, especially considering that the program will need a minimum of 50K as well. You can

The comparison is not ludicrous. You just might be able to turn out supercomputer graphics on a PC.

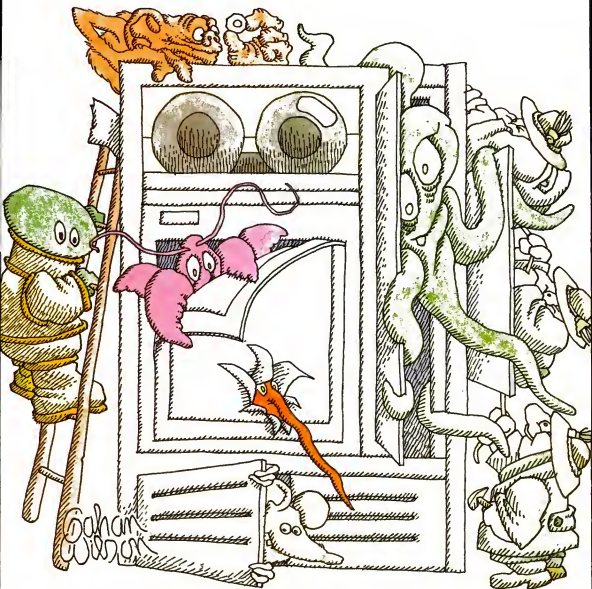
get around this by making just a portion of the picture at a time, or you could use a hard disk and read portions of the z-buffer into memory as needed.

In addition, the frame memory, which contains the color information for each visible point, would need a byte per pixel for each of three 8-bit color intensities or over 760K. This also could be put on a hard disk, at the expense of increased running time.

Once time and memory requirements are fulfilled, the third hurdle is finding software to handle the tasks of hidden surface removal, shading, and texturing. If such software exists, I'm not aware of it. However, such sophisticated graphics software is being developed for the PC that something is sure to be available soon if it doesn't already exist.

The comparison, then, is not as ludicrous as it might seem at first. If you had the time, the memory, access to a film recorder or high-resolution graphics terminal, and the software, you just might be able to turn out supercomputer graphics on a PC. It's a tantalizing possibility. ■

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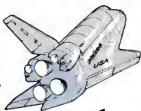
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DP NIGHTMARE.

Shuttle Radar and PCs Map The Earth



With the help of several PC-XTs, scientists from the Jet Propulsion Laboratory used a special radar aboard the space shuttle Challenger to map the earth.

Scientists, computer programmers, and engineers stare intently as NASA monitors, suspended by thick cables from the ceiling of the payload users' room at the Johnson Space Center (JSC) in Houston, flash ominous bits of data about the progress of their experiment—the Shuttle Imaging Radar, Version B (SIR B)—aboard the space shuttle Challenger.

"The radar antenna is stuck at 46 degrees," one scientist notes with alarm.

"Maybe we can fix the problem by readjusting a cable," another suggests. "Or if there's enough propellant, perhaps we can maneuver the shuttle to get some of our data takes."

Finally, the scientists reach a decision.

"We'll have to forget about data takes for the next few hours," concludes Charles Elachi, SIR B's chief investigator, "and replan for the remainder of the mission."

First, Elachi and three other scientists determine which data takes have been affected by the crippled antenna; then Henry Harris, chief programmer, and his associates use IBM PC-XTs to replan those data takes. Several hours later, the XT's have put the SIR B experiment back on course. The scientists, calmly watching a new screen of "engineering telemetry" flash every second on a monochrome monitor, pause occasionally to look at a map of the world on the color monitor. Political boundaries and target sites stand out against a miniature shuttle marking a



swath of radar on the map as it flies overhead.

A Plausible Mission

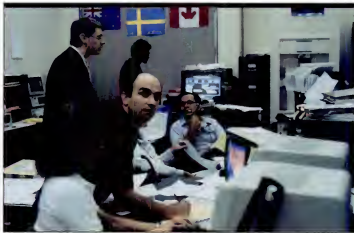
The previous scene actually occurred during one of JSC's full-scale simulations as part of the planning process for the Challenger's October 5, 1984, run. During the 72-hour session, a NASA computer simulated the orbit of the shuttle, sending data on the shuttle's position. This and other telemetric measurements—such as radar power, film advance, and transmitter power, which indicates to the scientists whether equipment on the shuttle has carried out its commands—were transmitted to investigative teams stationed in the payload users' rooms. Scientists responded as if the data were real, replanning their mis-



sions if necessary and sending commands to the payload commander, who in turn relayed them to the shuttle simulator, complete with astronauts.

The simulations also gave the SIR B team an opportunity to link all of its equipment, which included a PC network, the homebuilt BCE data-receiving computer, and NASA equipment used to transmit signals to and from the shuttle. The team also worked out minor bugs in the software and in the plans they'd been working on for the past 2 years back home, at the Pasadena, California Jet Propulsion Lab.

Above: A color-enhanced image taken during the SIR B mission. **Right:** Investigators use XT's in the payload users' room at JSC.



SHUTTLE RADAR

"Johnson Space Center wanted everyone to be as prepared as possible for the shuttle. That's why it always has a couple of dress rehearsals. It puts us through mock situations and throws anomalies at us so that we'll be ready for anything," explained programmer Mark Bergam.

A grassroots movement among members of the many scientific teams associated with the Jet Propulsion Laboratory has expanded the use of micros—IBM, NEC, Corona, and Apple—to accomplish many of the functions previously performed by mainframes. Also, JPL-wide effort was made to convert part of the JPL mainframe software and subroutine library into a form usable by microcomputers. But few projects used personal computers as extensively as did SIR B.

SIR B and a large-format camera were the largest experiments aboard the Challenger. During the shuttle's 8-day flight, the 10.8- by 2.16-meter "synthetic-aperture" radar antenna weighing 367 kilograms shot a narrow radar beam, similar to that of a police radar gun, at targets on the earth's surface that had been selected by 44 scientists worldwide. Some of the signals bounced straight back to the transmitting antenna, some were completely deflected by the earth's surface, and others straggled back, jostled and weak from the roughness of the land they'd hit. The returning signals were recorded digitally and processed by a mainframe computer into a visual image resembling a photograph. The blacks, whites, and grays in the picture corresponded to the intensity of

ComputerLand provided immediate replacement of failed machines, a crucial factor because the XT's were being used in "real time."



the returning radar signals.

The frequencies at which radar signals are emitted allow a radar to record images that a conventional camera cannot. Radar can, for example, bypass clouds, providing a clear image regardless of weather conditions, and it can penetrate certain earth surfaces as well. For example, a major discovery of SIR A, which flew on the space shuttle Columbia in November 1981, was the presence of ancient river deltas buried under 6 feet of sand in the Sahara desert. Archeologists use such data to determine where to look for ancient settlements, often located near deltas. In addition, radar yields sharp images at a resolution of 16 meters, meaning that highways or rivers are recognizable.

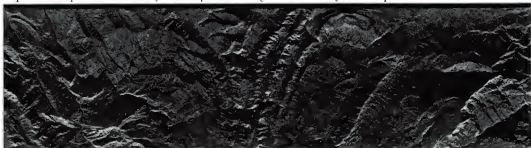
Specialists in agriculture, oceanogra-

phy, geology, and archeology studied the images from the SIR B mission for information on crops, ocean wave heights and currents, and land formations. During the SIR B mission, scientists also continued their search for the best uses for this relatively new radar technology and for the best ways to interpret the information recorded during the mission. To this end, some of the investigators went into the field during the mission, taking spot measurements with traditional methods to compare them with results from radar. For example, oceanographers were out in their boats taking measurements of wave heights with ropes and buoys to compare with radar data.

SIR B's ill-defined status, "somewhere between a lavishly funded project and a small experiment," gave Henry Harris, who is responsible for introducing micros to the project, the freedom to be creative in problem solving—the main problem being lack of funds. While large projects have tens of millions of dollars at their disposal, SIR B had a budget of \$4 million. Harris estimated that if he were to use a mainframe to do the job done by XT's, "this project would cost \$20 million. Using PC's maximized the use of the shuttle."

SIR B investigators also valued the PC's for their relative transportability. Scientists could easily pack them up and take them on an airplane to simulations and to the actual mission site in Houston.

A special service contract with local ComputerLand outlets, both in Houston



A SIR B image of the high plateau of northern Peru.

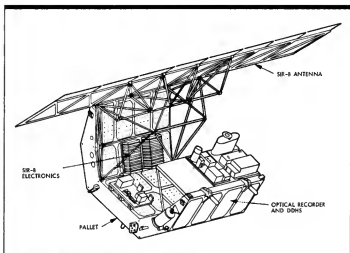
and in Pasadena, provided immediate replacement of failed machines, a crucial factor because the XT's were being used in "real time" throughout the 8-day shuttle flight. The programmers could perform minor repairs themselves.

Harris used five XT's with hard disk expansion units of up to 10 megabytes to accommodate the 1/2-megabyte programs he and coworkers Mark Bergam and Su Kim wrote for the mission. The XT's were fitted with 8087 coprocessors, color graphics cards, and a monochrome or RGB monitor and were all linked by an Ethernet network.

The software used during the mission, which contained ten main menus as well as second- and third-level menus, was written in Laboratory Microsystems's PC FORTH language, which Harris finds versatile, compact, and easy to program and debug. According to Ray Duncan, a FORTH program vendor, "SIR B's use of PC FORTH is the most extensive I've ever seen." Good software extended the capability of the PCs to handle tasks that previously required the capacity of a mainframe.

The main function of the PCs for the SIR B project was planning the data takes, both before the mission started and once it was underway. If the unexpected were never to happen, the second planning function would be unnecessary, since the mission is controlled from the ground when all goes well. However, astronauts were able to override the automatic system if they had to. After the mission was over, investigators used the PCs to select specific pieces of data for processing into images from the reams of information collected during the mission.

Preflight planning involved predicting the orbit of the shuttle and determining what angle the radar antenna must assume for the thin pencil point of a radar beam to hit a particular target. Before the mission started, the investigators created a blueprint of the track the radar antenna must follow for each data take. Generally, real-time planning is necessary only if the shut-



The unfolded SIR B antenna supported by its pallet.

tle's orbit deviates from NASA's predetermined plan, or if an anomaly occurs.

First, one of the XT's "propogated" or plotted the ephemeris, or master plan, of where the shuttle would be at any given moment. The ephemeris tells scientists the latitude and longitude of the shuttle at a given time, as well as the "ground track," the shuttle's path over the earth. Calculating the ephemeris, a service JSC provided for the SIR A mission, requires the "state vector"—numbers that give the position

and velocity of the shuttle—based on JSC data and calculated from the principles of orbital mechanics and trajectory analysis. Long before the mission, JSC gave SIR B programmers detailed information about the shuttle's planned orbit. If the shuttle had deviated from this orbit, JSC could have flashed the new state vector on NASA monitors, forcing programmers to recalculate the ephemeris. "We can calculate the ephemeris with nearly as much accuracy as JSC does," said Bergam.

The investigators took full advantage of graphics on the XT when planning and checking their progress in real time. Graphics made it easy for them to work within parameters—or constraints on planning—that might otherwise be hard to visualize. Said Harris, "The PC's graphics capability created a synergism between our ability to integrate information and the computer's computational speed."

With the ephemeris and telemetric data, several displays can be created on the PCs. First is a real-time map on the color monitor that shows the earth moving underneath as you would see it if you were in the shuttle looking down: as the shuttle moves, the frame on the screen shifts. The



The main function of the PCs for the SIR B project was planning the data takes, before and during the mission.

SHUTTLE RADAR

"world map," another projection of the shuttle in motion, shows the shuttle's orbit as it passes over the earth and the sweep of its radar on the ground. Both these maps include target sites, oceans, and political boundaries. In addition, the maps show either the entire globe or areas as small as 5 degrees by 5 degrees—500 square kilometers.

Besides creating a graphics picture of the mission for investigators, the PCs were used to help investigators stay within the parameters of the experiment. For example, when the shuttle performed a maneuver that required its rockets to fire, the radar antenna was folded into thirds, resting on a pallet spread across the shuttle bay over the other payloads. Folded, the anten-

na could not transmit, so the PC notified the investigator not to command transmission at that time.

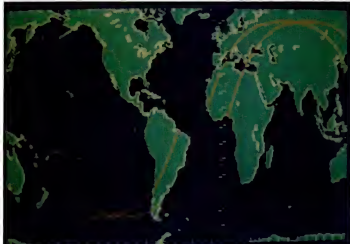
Unfolded, the antenna took up the length of the shuttle bay. When the shuttle orbited upside down, the unfolded antenna was turned toward earth. It had a 45-degree range of movement, rotating from 15 to 60 degrees. Here the XT used a program called the Inverse Planner to determine the "look angle," or the angle at which the antenna must point for the radar beam to hit its target.

Not only does the angle of the antenna determine whether the radar beam hits the target, but it also determines the kind of information an investigator can glean from the image. If the face of the antenna is parallel to the earth's surface, creating a beam that will arrive perpendicular to the ground, the image produced will cover an area of about 30 meters and will look sharp, owing to its high resolution. A wider angle will produce a wider radar swath—about 100 square meters—with lower resolution.

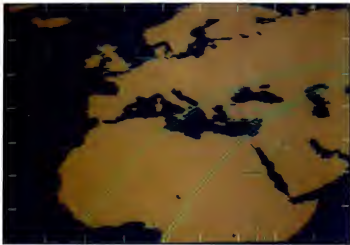
The programmers took into account the preferences of individual investigators. "Mapping" mode gives the cartographer images from contingent swatches taken at the same angle for consistency in mapping. "Stereo" mode allows the geologist to view the same target from different angles for a three-dimensional understanding of geological features.

Listening to the returning signal is another crucial parameter. The particular instant selected out of the stream of radar signals is called the *data window position*. To determine this position, scientists divide into 64 intervals the time it takes for the radar signal to reach the earth and bounce back to the antenna. They can "listen" to the signal at any one of these intervals. By using the known distance of the shuttle from the earth and the speed of the radar waves, investigators can determine the best instant to listen to the radar.

Another calculation done on the PC rather than a mainframe concerns the



Screen shot showing the world map and the shuttle's orbit.



Target sites and radar swath marked on map of Europe and Africa.

pulse repetition frequency (PRF), which limits the "chirp" or burst of radar signals that can be transmitted from the antenna. Since the same antenna both transmits and receives, the PC acted as a traffic cop to prevent the 1,275 chirps emitted per second during the 5- to 10-minute data takes from colliding with incoming signals.

Yet another parameter is the gain, or strength, of the radar signal. Scientists adjust the gain in a manner similar to the way you'd manipulate the aperture of a 35mm camera. Just as you'd reduce the aperture of the camera—that is, set it at a higher f-stop—for brighter lighting conditions, scientists must lower the gain for data takes from a highly reflective surface like the ocean. If the gain, like the f-stop, is not set properly, the picture produced will be over- or underexposed, yielding few details.

Once the data takes were planned, the programmers transmitted their commands to mission control at the Johnson Space Center over phone lines via modem. Mission control checked the SIR B commands for errors; the commands were then integrated with other commands for the experiments and for controlling the shuttle. The final group of commands was further processed for insertion into a Keyset console, which transmitted them to the shuttle on a daily basis by radio telemetry. Should the unexpected occur after the daily command transmission, the investigators could send limited real-time commands. Some SIR B commands were stored in an on-board computer that serviced all the experi-



The PC acted as a traffic cop to stop the 1,275 chirps emitted per second from colliding with incoming signals.

ments. In addition, SIR B had its own computer on the shuttle with a sequencer that "time-released" commands.

Once the commands were fulfilled, the shuttle's transmitting antenna was to beam the SIR B data to a TDRS satellite (Tracking Data Satellite System) or to ground stations around the globe. In this setup, one end of the transmitting antenna was attached to the shuttle, while the other tracked the TDRS satellite. If the body of the shuttle came between the antenna and the satellite, no data could be transmitted. To prevent this blockage, a program mask that plotted the orbits of the shuttle and satellite was used to determine when the antenna could transmit. This mask was calculated on the XT using the principles of orbital mechanics. Graphics on the XT also helped the scientists visualize the program mask. They thought of the antenna as a periscope, through which you see space, the satellite in the distance, and the tail and wing of the shuttle blocking

part of your view. The programmers used this periscopic view, displayed on the XT screen, to determine where the antenna was pointing and when the coast would be clear for transmission.

Maps on the NASA information monitors indicate the range of the ground stations and the TDRS satellite. When the mission was originally conceived, NASA had planned to have three TDRS satellites orbiting at equidistant points around the globe. But NASA had trouble launching the first satellite and has yet to launch the other two. Thus, when the shuttle was out of range of the satellite and ground stations, SIR B used analog and digital tape recorders aboard the shuttle as a backup. Optical data obtained by radar was recorded in analog form and stored on board the shuttle for later transmission.

Both the analog and digital data were beamed from the satellite to ground stations, then to various way stations such as the one in White Sands, New Mexico, before reaching computers in the SIR B payload users' room. The data, some of which would later be processed into images, was collected on magnetic tape at the Goddard Space Center in Maryland.

Engineering data that told the investigators whether the radar antenna had followed its commands arrived at the PC network through two telemetric links. One was through the JSC 370 mainframe's 4500-baud, bisynchronous F-band link and the other through the JPL's homebuilt BCE, 50-megabit, 9600-baud, asynchronous KU band link.

(continued)



This SIR B image shows Guayaquil, the largest city in Ecuador.



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SHUTTLE RADAR

All the engineering data was collected on one XT. Much of it was saved for later reference. However, data required for real-time displays was sent over the network to XT's equipped with RGB monitors and used for more planning, thus beginning the cycle anew.

The SIR B project's sophisticated use of XT's was an outgrowth and expansion of SIR A project's use of Apple personal computers. Harris used the Apple for limited planning, real-time displays, and printing commands. The SIR A mission, however, had no TDRS satellite to require tracking. The Apple's memory, limited to 64K, did not permit the investigators to calculate the ephemeris.

In the same way, SIR C, planned for a polar orbit in 1988, will expand on the work of SIR B. This ambitious project will accommodate the data requests of 120 investigators, two and one-half times the number participating in SIR B, and will use a more sophisticated radar.

And how did the SIR B mission turn out? During the mission, which lasted from October 5 to 13, 1984, SIR B was plagued with problems beyond the control of scientists and programmers. First, the communications antenna failed to track the TDRS satellite. Then, when the scientists decided to move the shuttle to point the antenna at the satellite, the radar panel refused to stow properly, preventing the shuttle from maneuvering. After it was repaired by astronaut Dr. Sally Ride, who used the Canadian-built mechanical arm to snap the latch securing the panel, data stored on digital and optical tape recorders was transmitted whenever possible. But instead of the 42 to 45 hours of digital data investigators had planned on, SIR B recorded only 12 hours. Many sites were imaged less thoroughly than originally planned, and others cut out entirely.

Fortunately, because of overwhelming demand from investigators worldwide, NASA has allowed the SIR B mission to fly again on the next Challenger flight, scheduled for April 1985.

But from the programmers' point of

view, the mission turned out to be a breeze. "Scientists were scrambling to figure out what sites they should image, replan, or cut. But we just programmed

it," observed Bergam. "Commanding, determining new orbits—it was a field day for us! Our software ran without a hitch." ■

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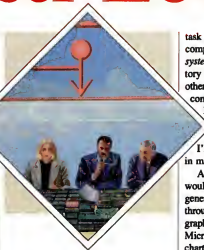
Zooming in For a Closer Look

Some industry observers currently believe that software requirements should dictate your hardware purchase decision. In fact, many go so far as to say that hardware will eventually become a disposable item. Is this a radical theory? Perhaps not. After all, I'm sure there's a dealer out there somewhere who's had a customer come in and say, "Ahhh, give me Lotus's 1-2-3 and something to run it on, please."

Well, Index Technology Corp (InTech for short) has come close to marketing software that is based on this concept with its *Excelsator* system, a \$9,500 software package that, parenthetically, runs on an IBM PC-XT, AT, or 3270 PC.

So, what does this \$9,500 software package do? My first thought was the obvious answer, "Anything it wants to." After further reflection, I decided that such a high-priced package should do everything.

But in fact, *Excelsator* does just one thing, and it does it extraordinarily well. *Excelsator* takes 99.9 percent of the drudgery out of the often mind-numbing



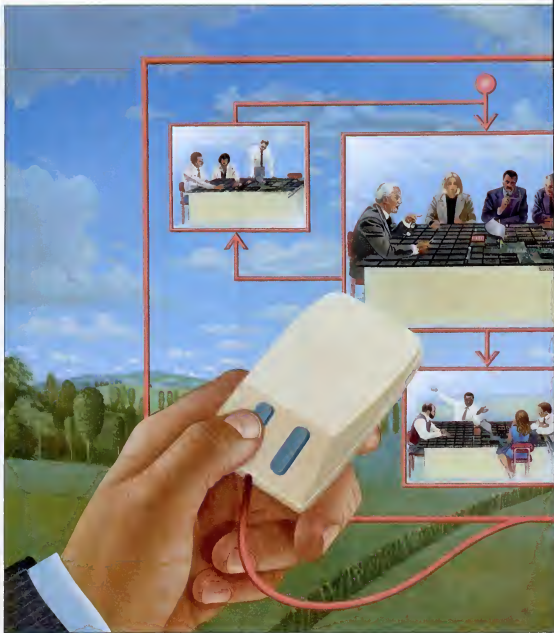
Index Technology's \$9,500 *Excelsator* takes the drudgery out of designing and documenting complex systems.

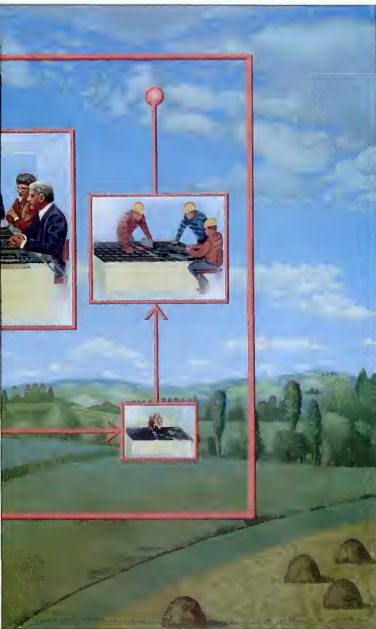
task of designing and documenting highly complex systems. In this case, the word *systems* refers to a computer program, factory process, chemical process, or any other collection of activities that has a complex, interdependent relationship.

However, since most PC readers equate the term *systems analysis* with computers and their programs, I'll use computer systems applications in my examples.

At the risk of oversimplification, I would describe *Excelsator* as a graphics generator hooked up to a word processor through an intelligent link. You use the graphics capabilities of *Excelsator* with a Microsoft Mouse to "draw" presentation charts, flow charts, or data structures. Then you use word-processor-type panels to describe the structures and relationships you created with the mouse. You can also use these panels to create and test I/O screens. And then you can use the full-featured word processor (Microsoft's *Word*, in this case) to document the system you create.

Excelsator's best feature is that it allows you to "explode" down, or zoom





into, ever more complex systems through the graphics panels. And it automatically keeps track of the text panels as you go and generates most of the documentation without user intervention. Finally, its printer drivers, capable of handling the best of the market's high-resolution printers, can generate all of the graphics panels on paper, appropriately linked, annotated, and documented—all with presentation graphics quality.

I'll explain each of these capabilities further on, but let's first take a look at the *Excelsator* package.

Let's Get Physical

Excelsator comes in a beautifully crafted package that includes two Tecmar boards, a Microsoft Mouse board and mouse, a keyboard template, *Excelsator* software and documentation, Microsoft's *Word* and documentation, Mouse software and documentation, and an "installation tool kit" (a screwdriver).

Excelsator is designed to run on an IBM PC-XT, AT, or the 3270 PC. It can be run on PCs that are configured with expansion units or a Compaq Plus with an enhanced power supply, but there are several reservations. First, the machine must have 512K RAM. *Excelsator* uses every bit of it and will not open the graphics routines if it senses less than the required memory.

(continued)



Excelsator

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List Price: Complete package (including hardware and software accessories) for the XT, \$9,500; complete package for the 3270 PC or AT, \$9,000; software only, \$8,400.
Requires: IBM-XT, AT, or 3270 PC; 256K RAM; IBM monochrome monitor; DOS 2.0 or higher

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EXCELERATOR

Second, the Tecmar graphics and multifunction boards, provided as a part of the *Excelsator* package, draw quite a bit of power—too much, in fact, to be used with a PC that has been modified to include an internal hard drive (unless the power supply has been upgraded). This is why InTech says *Excelsator* runs on a PC-XT or a PC with an expansion unit but not on a PC with an internal hard drive.

InTech realizes that some potential users may have already installed the Tecmar Captain multifunction board and the Tecmar Graphics Master graphics board or, perhaps, the Hercules graphics card. If you have the Tecmar multifunction board, you must send it to InTech for modification of the board's programmable array logic (PAL) chip. This chip is a transponder that receives a code sent by the *Excelsator* software during initialization and responds with an appropriate encoded answer. If the *Excelsator* receives the right answer from the chip, initialization continues. If it gets a wrong answer, *Excelsator* refuses to respond to user input. This is the only software protection used, but it is quite effective. It actually restricts *Excelsator* to a single CPU or, at least, to a single Tecmar board. The Hercules graphics board is software-supported, so if you already have this board, you can get credit for the Tecmar board.

Good Hot-Line

The complexity of *Excelsator*'s installation gave me the opportunity to work with InTech's hot-line staff, which is, in all respects, courteous, efficient, and knowledgeable. I began with a bare PC-XT that was equipped with only an IBM monochrome board, which I removed. Installation of the Tecmar boards and a Microsoft Mouse board took 20 minutes. Jumpers on both Tecmar boards and switches on the Captain board had been preset at the InTech shop, assuming an XT with 256K on the motherboard. Incidentally, 15 minutes of the 20 minutes installation was spent double-checking the switch and jumper positions.

Excelsator is designed to present graphics on an IBM monochrome monitor. Although dual (mono and RGB) monitor installations are supported, only the monochrome monitor is used with *Excelsator*. Switching to the RGB monitor for non-*Excelsator* applications requires that you turn the system off and reposition a toggle on the back of the unit. In addition,

The complexity of
Excelsator's
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InTech's staff,
which is courteous
and knowledgeable.

other software may require different graphics drivers to function with the Tecmar board. In other words, a machine that is set up to run *Excelsator* is essentially a "dedicated" machine.

In any event, software installation requires an additional 20 minutes. The hard disk must be formatted, and a batch-loading file must be transferred from the first of eight *Excelsator* disks. When the batch file is run, it prompts for each program disk, from which appropriate files and driver routines are to be read and written to the hard drive. After *Excelsator* is loaded, the user is prompted to load Microsoft's *Word* into a subdirectory, called MSTOOLS. Finally, the user must create a CONFIG.SYS file with the mouse and graphics-board drivers and, optionally, an AUTOEXEC.BAT file to bring up *Excelsator* on initial boot.

If you are experienced working with boards, it will probably take about 40 minutes for installation. However, if you have never cracked the case on an XT, you should plan on spending an hour for instal-

lation. Alternatively, if you would rather avoid opening the machine, InTech will provide an installer for \$750 per day plus expenses at your site or \$200 per system unit at InTech headquarters.

The only element left in the installation process is to install an appropriate software printer driver. While *Excelsator* supports just about any graphics printer, InTech recommends the \$2,000 Toshiba P1351 as the best price/performance compromise of the low- to medium-resolution printers. On the high-resolution end, *Excelsator* also supports the \$10,000 QMS 800 laser graphics printer. I did just fine with a \$500 Epson MX-80 with Graphtrax Plus.

Extensive Documentation

The documentation is extensive and well written. However, it does assume you have some knowledge of the theory of system design or, more specifically, the Gane & Sarson Structure Methodology (Chris Gane and Trish Sarson. *Structured Systems Analysis: Tools & Techniques*. Englewood Cliffs: Prentice-Hall, 1979). A short primer on the Gane & Sarson technique would be a nice addition, especially with a package that includes a screwdriver for board installation. Documentation elements include a 44-page features guide, a 40-page installation guide, a 150-page basic guide and tutorial, and a 10-page quick-reference guide. In addition, complete documentation is provided for Microsoft's *Word*, the Microsoft Mouse, and the Tecmar boards.

Excelsator is designed to be most useful in the programming department of a multimember shop—a place where four or five people are simultaneously working on the same project. To this end, *Excelsator* has three user types: system manager, project manager, and user. The system manager initiates projects and assigns project managers and users; a project manager manipulates files within his project; and the user uses all the functions in his section of a project. To control access, the system prompts for user name and pass-

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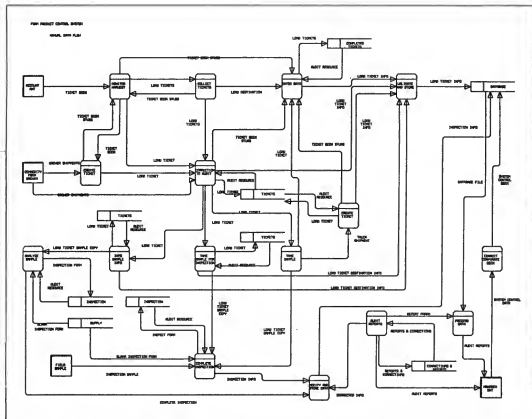
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EXCELERATOR



This data flow chart was created with Excelerator and a QMS LaserGraphics printer. Excelerator accommodates a variety of printers, and the output can vary according to which printer is used.

word during initialization.

If you successfully negotiate the log-on session, *Excelerator* brings up its main menu of the six main functions: graphics screens, documentation, the *Excelerator* "XL dictionary," reports, and house-keeping. You select an item by typing the first letter of its name or by placing the mouse-driven cursor over it and hitting the mouse's left button. I found that *Excelerator* is more mouse-oriented than keyboard-oriented—except, of course, in the documenting modes—so I used the mouse throughout for menu selection.

A Good Graphics Mode

Most users will spend their time in the graphics section. You use the tools in this *Excelsior* department to create, update, and manipulate presentation graphs, data model diagrams, structure charts, and data flow diagrams. Selecting any one of these elements puts the user in the graphics mode. The screen is divided vertically into a prompt screen and a drawing pad, with the latter occupying about 85 percent of the screen.

The mouse is used to "pick up" items in the prompt list and deposit them on the

drawing pad. Objects and automatic functions depend on the drawing mode selected. In the data flow diagrams, you can draw process boxes, external entities, data stores, and off-page connectors. With the mouse, these elements can be connected, labeled, moved, or deleted. In addition, the data flow screen, which is similar to other graphics screens, can be zoomed and unzoomed to focus on various areas of a chart larger than the screen itself.

An important item on the prompt menu is the **DESCRIBE** command, which allows you to assign names and descrip-

Obviously it is not a TOPVIEW!

However, **SYSTEMATE**, is the perfect way to integrate TOPVIEW with your other software that will not be capable of operating under TOPVIEW. Most best selling current PC/XT/AT software will not run under TOPVIEW, and much of the software currently under development will not either. Even a lot of the software being developed by IBM will not run with TOPVIEW management. Nevertheless, TOPVIEW will be the major tool for integration and management of text. However you will also want to be able to use other powerful standalone or integrated products that provide capabilities not available with TOPVIEW software.

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EXCELERATOR

tions to all of the objects drawn on the pad. These names and descriptions are managed by the XL dictionary, which assures consistency, accuracy and completeness of the system definition.

The XL dictionary is at the heart of the *Excelsator* system—the element InTech

**Excelsator's
explosion feature
enables you to
create multitier
diagrams, each with
progressively more
detail.**

claims sets *Excelsator* apart from other graphics tools. The *Excelsator* dictionary serves as the central repository for information about the system design, that is, the system that you are creating. Thus, you can easily standardize names, cross-check the completeness of the design, and even evaluate various enhancements by producing reports from the data dictionary.

Linking the graphics directly to the *Excelsator* dictionary means that you can make new entries and standardize names as the design is developed. To describe a graphics object to the dictionary, you merely point to the DESCRIBE command and the object to be described. The system will present a dictionary page already labeled with the object name. Then you add a sentence or two to describe the object, and the description is linked to the object in the dictionary.

The Explosion Feature

Excelsator's explosion feature enables you to create multitier diagrams, each with progressively more detail. For example, a process in an order entry system might be "enter new orders." A second level of detail might describe the processes of val-

More Room to Grow

The AT provides even more storage space for the memory-hungry *Excelsator* package.

The fact that the *Excelsator* program takes up 2 megabytes of space on a hard disk is a good reason to look at other systems that provide more storage than the XT—such as the PC AT.

The *Excelsator* runs quickly on the AT. In side-by-side comparisons between the AT and XT, almost all of the program's functions worked three times faster on the AT. And functions that go to the hard disk, such as DESCRIBE and EXPLODE, seem to have more than a triple-speed advantage.

There is no difference between the *Excelsator* package for the XT and AT, but installing the system on the AT requires a different installation program that changes the sampling rate of the controller board for the mouse so that it can keep up with the AT's internal clock. The Tecmar or Hercules graphics boards used in *Excelsator* have no problem matching the AT's speed.

If *Excelsator* on the XT allows systems analysts to do the drafting and design work in a few minutes that would normally take a day to do manually, then the same software on an AT provides an even better real-time savings.

According to Bill Clarke, the market-

ing services manager for Index Technology Corporation, the real advantage of the AT for *Excelsator* users is in the new computer's potential for multi-user operation. The multi-user version of DOS will allow several PCs equipped with *Excelsator* to share data files—a very desirable feature because of the size of many projects and the multiple functions of the program. Since a large project can create many megabytes of *Excelsator* data files, sharing files by passing around a floppy disk could become very cumbersome. Disk-drive sharing through a local area network is an alternative, but there are drawbacks caused by the networking software, and the load of simultaneous access by several *Excelsator* users on simple local networks could cause a considerable delay. A true multi-user system will be invaluable when a team is developing the screens and architecture for a large project with *Excelsator*.

The bottom line: If you can justify the investment in *Excelsator* as a tool for systems analysis and design, then the relatively small incremental cost in going to a PC AT is probably justified too.

—Frank J. Derfler, Jr.

identating a customer number, customer credit, part number, order date, shipping date, and so forth until you reach the tenth level.

The EXPLODE command works like the DESCRIBE command. You simply put the mouse cursor on the word "explode" in the prompt area and then move the mouse to the object to be diagrammed on another level. Up to ten levels of explosion are allowed. As you move to even lower levels, *Excelsator* first shows you the dictionary entry for the present level

and then displays the diagram for the next level. (For purists, the *Excelsator* extends the Gane & Sarson concept of explosion to include data stores and data flows. That is, an explosion into a data store or data flow will display a data model diagram of the data elements contained in the object or the record layout for the data.)

As you move around between diagram levels and fill in description pages, your system eventually becomes fully fleshed out. In a complete system, your dictionary will contain one or more of each of the

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following elements, shown here with their Gane & Sarson descriptions:

Data elements: Descriptions of individual data elements, such as input and output variables—edit rules, alias, and so on.

Data records: Descriptions of file records, including alias, elements, or other records it contains, and the occurrence of elements.

Data stores: Descriptions of data stores from data flow diagrams, including name, explosion graph, data record name, general text description, and the name of the data model graph.

Data model entities: Descriptions of data model entities from the data model graph, including name, explosion graph, data record name, and general text description.

Processes: Descriptions of process boxes from data flow diagrams, including ID, name, name of the explosion graph, and general text description.

Functions: Descriptions of function boxes from structure chart graphs, including ID, name, explosion graph, and general text description.

External entities: Descriptions of external entities from the data flow diagrams, including ID, name, name of the explosion graph, and general text description.

Data flows: Descriptions of data flows from the data flow diagrams, including ID, name, name of the record associated with the flow, and a general text description of the data flow.

Modules: Descriptions of program modules, including name, process it is used in, file, version number and date, author, date last modified, number of lines of source code, and general text descriptions of its function and processes.

User data managers: Descriptions of a user-created file maintenance application, including name, filename, location of key field on the record, and length of key field.

Documents: Descriptions of documents from document graphs, including document name and general text descriptions of contents.

Document fragments: Descriptions of document fragments, pieces of a document—such as text paragraphs, diagrams, reports, and screen layout—that make up the contents of a document.

Screen descriptions: Descriptions of the menu screens developed for a system, including the name of the screen, the author, date modified, and name of person who last modified the screen.

Data flow diagrams: Description of data flow diagrams, including name, name of the system-generated MS-DOS

After about 30 minutes of practice, use of the mouse becomes automatic—similar to touch typing.

file where the diagram is stored, and general text description of the diagram.

Structure charts: Descriptions of structure chart graphs, including name, name of the system-generated MS-DOS file where the chart is stored, and general text description of the chart.

Data model diagrams: Descriptions of the data model diagrams, including name, name of the system-generated MS-DOS file where the diagram is stored, and general description of the diagram.

Presentation graphs: Descriptions of the presentation diagrams, including name, name of the system-generated file where the diagram is stored, and a general text description of the diagram.

Document graphs: Descriptions of the document graphs, including name, name of the system-generated file where the diagram is stored, and a general text description of the diagram.

Records within records: Listings of

records that are contained within other records.

Elements within records: Listings of data elements and the names of records in which they are included.

Documents within documents: Listings of what documents are contained in other documents.

The Wrap-up

I found *Excelsator* to be totally logical to use. In fact, its menu structure and explosion feature forced me to think logically as I constructed the presentation graph, data structure, and data flow charts of a small phototypesetting system.

Graphics charts and diagrams can be created very quickly with the mouse. After about 30 minutes of practice, use of the mouse becomes automatic—similar to touch typing. For example, the symbols and their connectors and labels seem to appear on the screen as you think of them.

Revising a graphics chart or diagram is just as simple. The mouse is used to select "delete" or "move" from the prompt menu, and then the mouse engages the appropriate object for action. The screen is refreshed after each major addition, move, or deletion. Moreover, since the system remembers all previously assigned names—another feature I like—it is relatively simple to keep objects sorted out and correctly identified.

I like the explosion feature because it enables you to "think" your way from general concepts to specific data manipulation. From the top layer of a presentation chart, which is very general in nature, you simply add more detail as levels deepen until you are at the data structure and data layout levels. When you've reached this point, you've got a full-blown program—or, at least, the source code for one.

Furthermore, the fact that any number of projects can be worked on by various users and managers with different levels of access makes *Excelsator* ideal for a multiperson programming shop.

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EXCELERATOR

a documentation generator and is selectable from the *Excelsator* menu, it is not truly integrated into the *Excelsator* package. Therefore, it stands alone in form and function (see *PC*'s review of word processors, *PC*, Volume 3 Number 17.)

On the cautionary side, I point out that *Excelsator* is mainly designed to help

There are many projects that are too simple to take advantage of *Excelsator*'s features and would actually be slowed down by the use of this system.

systems managers with complicated projects that require complete documentation. There are many projects that are too simple to take advantage of *Excelsator*'s features and would actually be slowed down by use of this system. Also, as I noted at the beginning, *Excelsator*'s configuration almost requires a dedicated machine—no real problem in a program shop with dozens of machines and programmers, but perhaps a little excessive for a one-person house.

Finally, I believe *Excelsator* is expensive. It costs between \$8,400 and \$9,500, depending on which (if any) of the required Tecmar boards you already own. The XL dictionary and its capability to explode down into a system are, to my knowledge, unique to *Excelsator* and responsible for much of its costs. These features may be cost-effective for analysis in a multitember shop, but several less-expensive systems-analysis packages are available for systems designers who can get along without these features. ■

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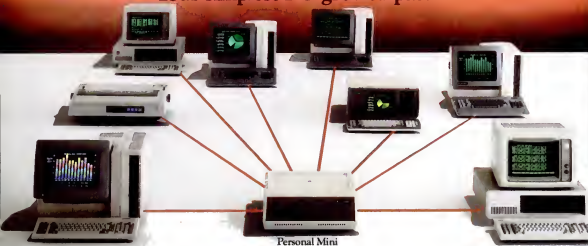
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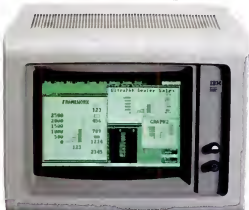
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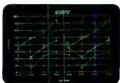
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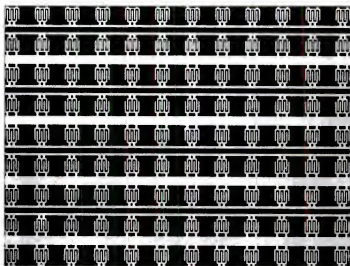
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Keyboard troubles? Who ya gonna call? Touchpen and Touch Information Display offer you an alternative: You simply touch the screen to input your responses.

SCREEN BUSTERS

Lately, most computer companies have been striving to make their computers and software programs more intuitive and easier to use. However, since the keyboard is still usually the only input device available, how friendly can they ultimately become? This is the argument behind such alternative input devices as touch screens and touch pens.

Touch screens and touch pens are designed to make it simpler for you to operate your computer and software, so the time spent using them is more productive. Unfortunately, some people view

these devices merely as gimmicks to differentiate products in a crowded marketplace, but research by several universities and Hewlett-Packard indicates they are real productivity tools and should be taken seriously. But the real question is: Will they make your job easier? Depending upon the application and your own personal preferences, the answer could be yes.

The most striking advantage of using these input devices in place of a keyboard is that you don't waste time looking for the right key; you just select the item directly from the screen, a more natural process

that eliminates a major source of error. In fact, you probably often hit wrong keys just because your attention is split between the screen and the keyboard. The touch screen has everything up front, so your attention is directed solely at the screen.

Two alternative entry devices are the EMS Touch Information Display (TID) terminal and the Sun-Flex Touchpen. These two closely related systems differ in that the Touchpen provides a pen for you to point and select, while TID allows you to use your finger or anything else that might be handy.

(continued)

"We decided waiting *another* decade for the standard in business software was too long."

Instead, Macola, Inc. has taken the Standard in Business Applications Software for *minicomputers*, from MBCA,[®] converted it to R/M COBOL for 16-bit computers, and created, we believe, the *Micro-Standard*.

Hundreds of microcomputer business applications packages from scores of programmers were rushed to market during the last ten years as the microcomputer became an everyday business tool.

Many were fine packages—filling niches, stop-gapping problems, allowing the businessperson to *maintain*—probably not drop behind, but definitely not surge ahead.

What was missing from these packages varied from package-to-package. Some lacked power. Some, simplicity. Others, clarity. Most lacked real integration.

Introducing Some Old Software

During those ten years, Mini-Computer Business Applications, Inc. (MCBA), was quietly establishing the standard for Business Applications Software for minicomputers.

Today, much of the new software developed by other companies boasts compatibility with MCBA's packages.

Macola, Inc., finding the current micro-packages unacceptable against the standards they sought, and realizing the time

involved in developing their own set of packages, approached MCBA, obtained the rights to convert the powerful minicomputer software, then did just that.

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SCREENBUSTERS

The TID Touch System

The TID terminal is composed of a 12-inch amber monitor with a nonglare surface and the electronics to enable touch sensitivity. The monitor displays 80 columns by 24 rows and emulates an ADM-3A terminal, which is one of the standard terminal types in use today. An IBM-specific model now in the works will be able to accept IBM PC graphics and control codes. There is also a keyboard that can be connected to the TID, but it wasn't available for this review.

The TID uses rows of lights (LEDs) and "eyes" (phototransistors) that are arranged in a 27×24 matrix of infrared light beams to create 648 touch-sensitive points on the screen. When your finger or something else touches the screen, the beams are broken, and the TID sends a signal back to the computer.

My first reaction was that I might not get a consistent response from the touch screen because the touch points might not be close enough together. Surprisingly, I found the opposite to be true; the average finger covers at least two of these touch-sensitive points. On the other hand, when I tried to make a selection with the tip of a pencil, I wasn't successful because the pencil point was too small to break the beams. I also tried using a pencil eraser, which worked fine.

The TID can be set so the codes it sends back to the computer can be x-y coordinates giving the location that was touched, or you can program areas of the screen to send a specific character when the appropriate area is touched. The screen ignores those areas that have not been defined in



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Requires: RS-232C interface.

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the program. This ability to program the return codes of the TID makes interfacing it to a computer relatively easy. Normally, when you write a program for this type of device, the program might have to search

When I asked EMS
for technical
support, I got it.
The person who
answered knew how
to take care of
my problem.

through hundreds of touch values to determine if a specific area of the screen is touched. This can slow down the response time of the computer. However, since the TID can be programmed to send a single character for each of the defined areas of the screen, the program looks for only those characters.

Easy Installation

Setting up the TID is easy; I plugged it into the wall, connected it to the computer's serial port, and turned it on. At first all went well, but after about 30 seconds I saw a flashing cursor in the upper left-hand corner. The TID has internal diagnostics to determine if something is wrong. Eventually I received the message "Bad beams 22." I had no idea what this meant, so I called EMS. When I asked for technical support, I got it; the person who answered knew what the message meant and how to take care of the problem. He gave me the option of either returning the whole terminal or having him send me a replacement part, which I'd install myself. Since the terminal was already broken, I figured I had little to lose and elected to replace the part myself. Over the phone, he told me how to remove the defective piece and how to install the new one when it came the following day. Everything has

worked fine since.

The next step was to get the TID and my computer talking. To set the terminal properly, I needed to know three technical pieces of information: the speed (baud rate), bits per character (either 7 or 8), and parity. Since the IBM PC sets these parameters through software and since they can be changed easily, the task was to make sure that both of them were set the same way. With the PC, you can set the communications port from DOS with the MODE command, or it can be set with the program you are running. The programs I used set the port for 9600 baud, 8 bits, and no parity. With this information at hand, I was ready to configure the terminal.

To configure the terminal, you push a button in the back of the display; this button, for some reason, is labeled "trap." Because it's recessed inside the back of the terminal, I had to use a small plastic rod that was supplied with the TID. After pressing the button, I was presented with the configuration screen, which consists of a number of boxes for selecting the different parameters for communicating, with the current values shown in reverse video. Here I got my first taste of touch inputting. The TID lets you select the baud rate and other information by touching the appropriate box. This is not only much easier than having to type in the parameters, it's actually fun. You needn't actually touch the screen; the beams extend a fraction of an inch beyond the screen. Once you make your selections, you press the word "done" on the screen to save the new values into nonvolatile memory. At this point, the TID is ready to use.

Software programs used with the TID must be written specifically for it. They must send special codes to the TID and get your input through the serial port.

There are two things to consider when programming the TID: programming for the display and programming for the touch panel. Programming for the display is similar to programming on the PC. Text is sent to the screen, and codes are used for graphics and moving the cursor. However,

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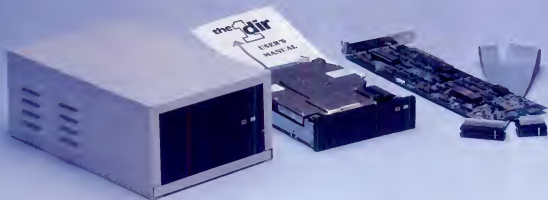
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er, programming the touch panel is unique to the TID. Here, special commands are sent to the touch screen to define the active portions of the screen. These commands

determine touch-area size, location, and the return codes. The control codes are not difficult to use. On the other hand, they do not seem to follow any kind of pattern—

mnemonic or otherwise—and take a little getting used to.

Because programs need to be specific to the TID, you can't use programs like Lotus's *1-2-3* or *WordStar* unless you feel like doing some heavy-duty BIOS work. This does not mean that it is incompatible with the PC, just that the programs you use need to do their input and output through

Using a touch screen, even a preschooler is able to take advantage of computer-assisted learning.

the communications port. The TID will be ideal for use on the new PC AT when XENIX is available, because the additional terminals will need to be connected through the serial ports.

Demonstration Programs

EMS provided me with several demonstration programs for the PC in BASIC. But when I asked if they were part of the package, I didn't get a clear answer. If you can get them, you're probably better off because it's always easier to learn from someone else's example rather than having to do it from scratch. The programs are varied enough so I could see most of the codes used in context. These programs also demonstrate the advantages of the touch screen over a conventional keyboard.

The TID manual is clearly written, but it lacked examples of programming in BASIC or in C to show how the TID is used. The only programming example provided in the manual is a Heath-89 assembly language program, which I found to be less than useful.

The major shortcomings of the TID, and of touch screens in general, are that your arm may get tired after prolonged

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use, and it does not have the pinpoint resolution of a mouse or a digitizing pad. But the TID is easier to learn and use than either a mouse or a digitizing pad.

Despite these limitations, the EMS touch screen is ideal for educational or database retrieval systems that require you to type in selections and responses to questions. With a touch screen, even preschoolers can profit from computer-assisted learning. Touch screens are already in use in public-access points, such as buildings, malls, and libraries, to assist visitors with directories. I have also seen them at trade shows as part of computerized directories.

I recommend the TID to anyone who needs a reliable touch-sensitive display terminal. I believe the TID is a significant step toward a new generation of easy-to-use computer systems.

The Touchpen Difference

Another natural way of using a touch terminal is by using a pen or stylus instead of your finger to indicate selections or responses. Although this interface is not as direct as using your finger, it provides greater accuracy.

A touch pen is similar to a light pen, but the touch pen uses a mesh panel in front of the CRT instead of the light from the CRT to know where you are pointing to.

The Sun-Flex Touchpen system is made up of two parts: the software, called *AutoCAD*, is a collection of programs that enables the computer to become a drafting table, and the touch pen hardware consists of a controller board, a touch-screen panel for the CRT, an off-screen touch panel (Cadpad), and a pen for pointing.

The system uses a combination of a conductive mesh panel and a touch pen, which is also conductive, to send information to the computer. The mesh panel is a finely woven mesh of conductive black fibers that is mounted in a printed-circuit frame. The frame is mounted directly on the CRT and is held in place by the front bezel. The controller card sends alternating horizontal and vertical voltage signals across the mesh panel. When the pen touches the panel, the converter electronics sense the magnitude of the two alternating voltages at the point of contact on the screen. These voltages are then converted to relative x-y coordinates, which the application program uses to know

where you touched the pen to the screen.

The touch pen has two metal rings toward the tip that act as a switch when your finger is put across them. The switch can be used to augment the functions of the pen. Its use is defined by the applications program you are running. For example, you might use the pen to select items from a list and the button to indicate that you are finished choosing.

The Touchpen system is designed for use with the Victor computer or the IBM monochrome monitor used with a Hercules graphics board.

Although the Sun-Flex pen interface can be used for a wide range of products, penlike pointing devices have generally



Touchpen

Sun-Flex
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Novato, CA 94947
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SCREENBUSTERS

been relegated to drawing applications—specifically where there is a need for fine resolution—while still retaining the simple and natural feel of a pen.

The manufacturer suggests you have the dealer set up the Touchpen. The monitor must be disassembled and the video tube removed to get at the mesh panel, which is placed between the video tube and the bezel. I suggest you don't do it yourself because it will void your warranty, and it is very dangerous if you don't know what you are doing.

Touchpen software setup is also left to the dealer. This setup consists of two parts: the calibration of the Touchpen and the installation of the AutoCAD drafting software. To calibrate the Touchpen, you have to run four different programs. Three of the programs are for thoroughly checking out the workings of the touch system. The fourth program records readings of the Touchpen from different parts of the screen that you need to run for the actual calibration. While running this software, I quickly discovered the limitations of the Touchpen. You are asked to touch 81 different points on the screen and to verify each one by pressing the Enter key on the keyboard. I had to run this program a second time because the calibration wasn't close enough—I began to feel pain in muscles I never knew existed. The software that is distributed with the Touchpen is called AutoCAD-86. It is written by a company called Autodesk and is a general drafting and design program for the PC and compatibles. AutoCAD-86 can be used with most video boards, mice, tablets, and plotters available for the PC. Menu options let you tell the program the specifics of your system.

The manual I received for the Touchpen was a prerelease version. An omission that was particularly troublesome was that all the programs on the utility disk ended with a .8 extension, but the manual instructs you to load each of the programs by only its first name, leaving out the 8. Not surprisingly, when I followed the instructions, the result was a "File not

found" error message. Life would be easier if the entire name of the file to be loaded was given or if the files ended with .BAS, the default extension for BASIC.

This may sound like a minor complaint, but it could be a real problem for someone unfamiliar with BASIC.

The touch pen is lightweight, but my

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arm got just as tired using it as it did with the TID system, which allowed me to use my finger or whatever I wanted as a stylus. This complication should be considered before writing any application using either a touch screen or a touch pen. The drafting program, AutoCAD, does a good job of taking this into account. It makes use of the Touchpen screen, the Cadpad (an off-screen pad), and the keyboard for entering commands and drawing. The screen and Cadpad are used interchangeably, thus reducing fatigue by varying the usage between the screen and the Cadpad pen.

How does the Touchpen system compare to a normal light pen? An important aspect in evaluating any user interface is to judge the feel and comfort that it affords. When I use a light pen it reminds me of drawing with a large crayon; it is heavy and somewhat bulky. In contrast, the touch pen feels light, not cumbersome.

The Cadpad Advantage

An additional advantage of the Touchpen system is the Cadpad. The useful possibilities of this pad are limited only by your imagination. It can be used separately or in conjunction with the display. For example, you can select items from a Cadpad menu while you use the screen for drawing; this setup would save you from holding up your arm to the screen all of the time. The Cadpad can also be used as a numeric keypad; you would select numbers with the pen. The pad and pen can even be used as a mouse. The flexibility of using both the screen and the off-screen pad expands the system beyond what light pens have to offer.

Overall, the Touchpen system can provide a balanced set of input devices for your PC: the keyboard for data entry and the screen and pad for data manipulation. The one drawback of the Sun-Flex Touchpen is that the only software package available for it is AutoCAD. Sun-Flex tells me that they are currently looking at some word processing applications. When and if they develop these applications, I will be happy to take a look. ■

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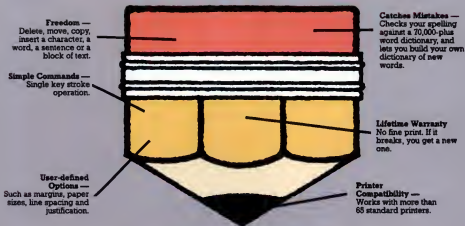
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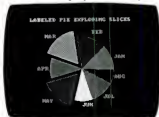
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A bit of work and the right hardware will let you add a mouse interface to almost any PC word processing program—with varying degrees of success.

Some PC owners are starting to suffer from the effects of a mild epidemic of "Mac-envy." The disease has many causes, but one of the principal symptoms is a suspicion that a mouse may be more than a cheesy gimmick. Mouse proponents claim that it can revolutionize the way people interact with computers. I wondered how much of a difference a mouse would make. I suspected that using a mouse to edit word processing documents created on a variety of word processors might be a good way to test the concept and to see how it applies to the PC.

It seems natural and intuitive to use a mouse to cut and paste by pointing to text, selecting it with a button click, and then dragging it to a new position. Pop-up (or pull-down) menus that appear and disappear with a click could eliminate the need to spend long hours studying a manual. To see if the PC was capable of making good use of mice, I tested one on some of the most popular word processing programs for the IBM PC: *WordStar*, *MultiMate*, *Volkswriter Deluxe*, *Symphony's* word processing module, *Microsoft Word*, and *Visi On Word*. (See Figure 1 for a quick comparison of how well they got along.) Only the last two programs—*Microsoft Word* and *Visi On Word*—were designed for mice.

I chose a mouse from Mouse Systems of Santa Clara, California, for the test. This three-button mouse comes with software that translates mouse movements to cursor control-key signals. Thus, you can use it with just about any word processor, although with varying degrees of success. The software also includes user-modifiable pop-up menus for some of the most

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MOUSE

popular spreadsheet and word processing programs. You can design your own menus for almost any program by specifying the prompts and the sequence of keystroke equivalents that will be sent to the program in response to the mouse action you select. This customizing feature is critical to fine tuning the mouse to respond to your taste and to changing the menu choices to the ones you want. In particular, you can dramatically improve mouse performance by changing the mouse-movement parameters from their default settings.

Since most of the word processing programs I tested were designed to accept input only from the keyboard, you might wonder how a mouse works with programs that don't know it exists. A "mouse driver," run before starting your word processor, handles the interface. The mouse driver sits in the background, watches the communications port that the mouse is attached to, and feeds signals into the keyboard buffer. The word processing program accepts those signals from the buffer just as if they came from the keyboard.

Mouse movements are translated into arrow key signals much faster than you could have hit the actual keys. When everything works properly, the driver

gives you the impression that the cursor location is physically attached to the mouse. You get the feeling that you can make the mouse really fly around the screen.

Mouse button clicks tell the driver to take control, suspend the word processing program, and initiate pull-down (or pop-up) menus. Your selection from the menu sends the word processor the keystroke signals that execute the chosen command. The mouse systems driver, plus the menus I used, consume 10K of RAM. This consumption could be a problem if your PC has just barely enough memory to run your programs without the mouse.

Several factors determine whether a mouse is a pleasure or a pest. The most important issue is fast and precise pointing. The mouse should move the cursor much faster than the keyboard can. The cursor should stop exactly where you aim it, with no overshoot. It ought to give you the impression that the cursor is an extension of your hand, and that you are literally pointing to a location on the screen.

Almost as important is the quality of the pop-up menus. Well-constructed menus make programs easier to learn and simpler to use, while clumsy menus can confuse you and slow you down. A quality design works smoothly with the pro-

gram's features and the user's needs. The menus for Lotus's 1-2-3 are a good example: they serve as a reminder that good pop-up menus can even aid systems that don't use a mouse.

WordStar

It is difficult and unrewarding to use a mouse with *WordStar 3.0*. Apparently, *WordStar* cannot move the cursor on the screen as fast as the mouse can send it signals. I felt like *WordStar* was fighting the mouse. The cursor moved slowly and only after a brief delay. Worse, the cursor kept moving after the mouse had stopped. Moving the mouse too quickly caused garbage characters to appear on the screen, and they stayed there until the cursor stopped moving.

The *WordStar* driver's pop-up menus were fine. Mouse Systems integrated the pop-up menus and the mouse by using the mouse's left button for edit commands, the middle button for movement, and the right button for file commands. The pop-up menu improved on *WordStar*'s own menus by appearing only when you need them and not cluttering up the screen when you don't need them.

Volkswriter Deluxe

Volkswriter Deluxe offers fast and precise mouse movement of the cursor. It moved the cursor much faster than the keyboard controls could. However, the unmodified driver for *Volkswriter* would move the cursor horizontally and vertically, but not diagonally. Luckily, the Mouse Systems software lets you adjust response sensitivity as well as redesign the menus. I changed the "hysteresis parameter" from (1,1) to (4,3) and the cursor then responded properly to diagonal movements of the mouse.

The *Volkswriter* driver's pop-up menus are good, but limited. They seemed to be designed for an earlier version of the program; they don't include features added to *Volkswriter Deluxe*. Like the *WordStar* implementation, the *Volkswriter* driver's pop-up menus use the mouse's left button

Mouse Cursor Movement

	Quality	Speed	Accuracy	Does the mouse improve the program?
<i>WordStar 3.3</i>	Terrible	Poor	Poor	No
	Very		Very	
<i>Volkswriter Deluxe 2.0</i>	Good	Excellent	Good	Yes
			Very	
<i>MultiMate 3.22</i>	Fair	Good	Good	Somewhat
<i>Symphony's word processor</i>	Uneven	Fair	Good	Marginally
<i>Microsoft Word</i>	Excellent	Excellent	Excellent	Absolutely
<i>Visi On Word</i>	Excellent	Excellent	Excellent	Absolutely

Figure 1: This chart shows the performance of the Mouse Systems mouse with six popular word processing programs and my impressions of whether or not the mouse was a useful addition to the program.

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for edit functions, its middle button for movement commands, and its right button for file manipulation.

MultiMate

The *MultiMate* 3.22 driver offered generally good cursor movement. The cursor responded fairly quickly and precisely, and it moved faster controlled by the

The driver for Symphony's word processor possessed strange mouse-movement characteristics.

mouse than it did when controlled from the cursor keys. Again, I had to change the hysteresis parameter, from (2,2) to (4,3) to obtain diagonal cursor movement. But because of the way *MultiMate* stores and displays text, when the cursor passes an end-of-line mark, it jumps to the leftmost column of the next line. This made mouse control difficult.

The pop-up menu design was clumsy on the *MultiMate* driver. It uses the left button for menu selection, makes the center button equivalent to the Enter key, and emulates the Esc key with the right button. Since the program uses only one menu button, it can show you only one top level menu. This limitation makes it necessary to click through several levels of submenus to get anything done. It also means that the menus often hold too many selections. For example, the "Movement & Copy" menu holds 18 choices. *MultiMate*'s pop-up menus were implemented for a one-button mouse and fail to take advantage of the capabilities of the three-button Mouse Systems mouse.

Symphony Word Processing

The driver for *Symphony*'s word processor possessed strange mouse-movement characteristics. *Symphony* appears to

MOUSE

discard cursor signals when they arrive too rapidly. When you move the mouse slowly, the cursor moves properly—but when you move the mouse quickly, the cursor does not move as far as you would expect it to. You can actually move the cursor faster by moving the mouse slower. At least the cursor does stop properly so that you can position it accurately. It may be possible to adjust to this unnatural cursor movement by practicing moving the mouse at the optimum speed, but this is not a good mouse/program interaction.

Microsoft Word

Microsoft Word 1.0 was designed to be used with a mouse, and that makes all the difference. It permits absolutely great mouse movement of the cursor on the screen. Mouse Systems supplies a software driver that makes its mouse emulate the Microsoft mouse, so it meshes perfectly with *Microsoft Word*. With the other

Sometimes a mouse does a word processing program far more harm than good.

word processors, the mouse was grafted onto the programs. *Microsoft Word* even changes the cursor shape on a color monitor from a blinking underline to a large arrow, intensifying the impression that you are pointing at a character. Instead of pop-up menus, *Microsoft Word* runs a menu across the bottom of the screen, and you point to your choice with the mouse.

What really sets this mouse-software combination apart from the others is its vast array of mouse commands and controls. Sensitive areas on the screen are signalled by a change in the shape of the mouse arrow. A "scroll bar" runs along the left-hand edge of the screen. If you place your mouse one third of the way

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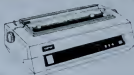
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MOUSE

down the scroll bar and click a button, the text scrolls down one-third of a page. There is a "thumb" mark along the scroll bar that visually indicates your current position as a fraction of the total document. If you place the mouse one-third of the way down the scroll bar and click the left and right buttons simultaneously, the screen moves to a spot that is one-third of the way into the document. It's just like thumbing open a book. You can split the

bottom of each window. When the pointer touches the command, it flips into reverse video and a command description appears. It is easy and fun to change window sizes

and move the windows around the screen. Mouse movement is quick and precise. The *Visi On Word* mouse is a two-button optical mode manufactured by Mouse

Microsoft Word 1.0 was designed to be used with a mouse, and that makes all the difference in the world.

screen into two windows by moving the mouse arrow along the top bar to the place you want the split to occur and clicking a button. The mouse can even change the size and shape of a window. And that's just the beginning: there are many more mouse commands and features.

If there is a drawback to this well-thought-out symbiotic relationship, it is just that it sacrifices simplicity of use for more powerful features. That makes the mouse more versatile, but more complicated to learn. Most software uses mice to make a system easier to use and faster to learn, while *Microsoft Word* uses it to add features. I prefer using a mouse for simplicity instead of sophistication, but if you really need powerful formatting and text manipulation features, *Microsoft Word* is an important system to examine.

Visi On Word

Visi On Word gives you a mouse, windows, and a system interface that makes your PC resemble a Macintosh without the icons. The cursor appears on the screen as a pointer, and the system command options appear as a bar menu along the

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Systems. Not surprisingly, the three-button mouse tested with the other programs can also be used with the *Visi On Word* system. *Visi On Word* uses the left button to select a command or a window and the right button for scrolling. Pushing the right button and moving the mouse scrolls the contents of the window in that direction until you release the button. The distance you move the mouse controls the scrolling speed. *Visi On Word's* mouse interactions are excellent. When you move the mouse, the pointer moves quickly and accurately. However, when using a color monitor with the *Visi On Word* mouse driver, a perceptible lag occurs between the pressing of a key and the appearance of the corresponding character on the screen. This lag can be a bit disconcerting.

After trying the mouse on a number of word processors, I am quite enthusiastic

Visi On Word's mouse interactions are excellent. When you move the mouse, the pointer moves quickly and accurately.

about the concept. Using a mouse to point and manipulate text makes editing much quicker and simpler. How much it helps depends on your style of writing and the extent to which you revise your work. Pop-up menus make it easier to get started, since you don't have to learn the

key sequences for basic text manipulation. If you use the word processor infrequently, you can avoid the need to relearn all the special keys each time you have to type a letter, although you will need to read the manual to understand and use each system's advanced features.

Any problems lie in the implementation of the concept on the PC. When the mouse is designed as an integral part of the word processor, as in *Microsoft Word* and *Visi On Word*, its benefits are generally well utilized. Attempting to force a mouse on a program not designed for it, however, leads to mixed results. While *Volkswriter Deluxe* was improved by the addition of the Mouse Systems mouse, the mouse was of limited value (even hindering some operations) on *MultiMate* and *Symphony's* word processor. It did more harm than good when applied to *WordStar*. ■

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TEAR AND COMPARE

Checkerboard Challenge

Whether you're a beginner out to learn the game or a master looking for competition, *Gramps* and *Sargon III* should provide you with hours of checker- or chess-playing enjoyment.

If the truth must be known, I don't like the game of checkers very much—at least, I didn't before I met *Gramps*. But then, *Gramps* is much more than a computerized checkers opponent. It is a well-designed and well-produced program that should be held up as a standard for game software of all kinds. This level of professionalism is rarely achieved by a one-man company such as Oakcrest. My thanks goes out to Kevin Bastian for reviving my interest in checkers.

It's quite difficult to get lost in this program. The display board is clear, easy to read, and always accompanied by a text prompt telling you what to do next. Moving a checker is straightforward: You position the hand-shaped cursor over the piece you want to move, press Return, reposition the cursor on the destination square, and press Return again. An error message will in-

form you of any illegal move.

The real beauty of *Gramps*, however, is the wide range of game parameters that you're allowed to control, all through the use of four simple menus. The Game Selection menu allows you to use the PC's function keys to select from the four main game variations: regulation checkers, giveaway checkers (the first player to lose all his pieces wins), kings (all pieces start as crowned checkers), and giveaway kings. I found these variations

enjoyable and eminently playable.

Other function keys on the main menu allow you to call up detailed and well-written rules for game play and program operation, resume a game you have saved on the *Gramps* disk, or exit to DOS. You can also call up an impressive Optional Features menu, which allows you such options as watching the computer demonstrate its moves, or having a beep sound after moves. Without a doubt, the best option on that menu con-

Your move...

Press F1 key
for help.

Select piece to
move by using
the cursor
keys on the
numeric keypad
to move hand
over piece;
Then, press
the Enter key.

Press Esc key
to start your
move over.



The clearly laid-out *Gramps* display board provides many helpful prompts.



Gramps: The Checker Champion

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cerns the rule for jumping. It's up to you whether or not you are required to jump whenever you can.

After the game variation and parameters are selected, there appears a menu of 30 skill levels that range in average response time from 1 second to 24 hours. The default is level 5, in which the computer takes an average of 3 seconds per move, and most players should feel comfortable with this setting.

The fourth and final menu can be called up during a game by pressing the F1 key. This Mid-Game menu allow you to save a game in progress, change the options or skill level, reread the instructions on how to move, or quit the current game.

One additional feature, albeit a small one, seems worth mentioning. Let's say you are playing a game of *Gramps* in the office when the boss walks into the room. You exchange your smile for a working frown of concentration, press F9, and the monitor turns black!

On PC's scale of one to six, *Gramps* rates:

FUN:	2.5
CHALLENGE:	4.0
GRAPHICS/SOUND:	5.0
TOTAL SCORE:	11.5



Sargon III

Hayden Software Company
600 Suffolk Street
Lowell, MA 01854
(617) 937-0200
(800) 343-1218
List Price: \$49.95

Requires: 64K RAM, one disk drive, monochrome monitor or color monitor with color/graphics adapter.

CIRCLE 799 ON READER SERVICE CARD

Dan and Kathe Spracklen used to work at Burroughs and Univac as mainframe computer specialists. Then one day they chucked the corporate life to write chess programs for microcomputers—not a surprising decision since Kathe had been

a tournament chess player. Over the last 8 years, they have created a number of commercially successful, state-of-the-art computer chess opponents, including *Boris*, *Chess Challenger*, *Sargon I*, and *Sargon II*. All of these can shamefully trounce most chess players, but none

**My biggest
complaint is that
the pieces are too
abstractly drawn.**

could match strategy and tactics with the Spracklens' newest creation, grandmaster *Sargon III*.

Sargon III consists of two disks and a thorough, well-written, 80-page manual that starts with a good section for beginners on how to move the pieces. The first disk contains the game program, and if you already know how to play chess, you can probably boot it (after installing DOS) and begin a game without touching the manual. And believe me, you won't mind that the program defaults to the easiest skill level!

The display consists of the chessboard and a message area showing time clocks for both players, *Sargon's* playing level, a listing of the moves made so far, and any special messages concerning such things as a king in check or an illegal move. Initially, this screen is black and white. You can turn on the color by pressing Alt-C, but this adds very little to the visual effect. Unfortunately, the chess pieces are too abstractly drawn, and your game will probably suffer until you get used to them. This is my biggest complaint.

My biggest compliment is for the speed at which *Sargon III* can offer me strong competition. I'm not a bad player, yet I have won or drawn only 10 percent or so of my games against this program, even those played at the easiest of nine skill levels with *Sargon* averaging 5 sec-

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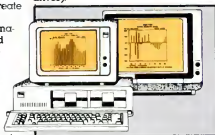
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onds per move. As the skill level is increased, so is *Sargon's* "thinking" time—up to 10 minutes per move on level 8. *Sargon III* will take as much time as it needs on level 9, best reserved for solving chess problems. And you can handicap the program so that it is not allowed to "think" while it's your move, effectively doubling the number of skill levels.

Making a move is simple. Just type in the standard chess notation based on rank (A-H) and file (1-8) coordinates. There is also an alphabet of commands that can be performed by pressing the Ctrl and a letter key. For example, Ctrl-B allows you to take back as many moves as you like, one at a time. This is

It is hard to
avoid depression
when a machine
beats you at a
familiar game like
chess.

one of the better ways to study a chess position and is a great feature. The other 23 commands do things like offer a draw, save or load a game, set individual chess clocks, print the board position or a list of moves, switch sides in the middle of a game (the cheater's delight), and so on.

Novice, intermediate, and advanced players alike will appreciate the second disk, which contains chess problems and 107 classic historical games. All the famous names in the history of chess show up in the games. You can pit your skill against the best and study their strategies at your own pace. Anticipating the moves of the masters is a real challenge. The 45 different chess problems are divided into five sections—checkmate, opening, tactics, strategy, and endgame—illustrating many fine principles.

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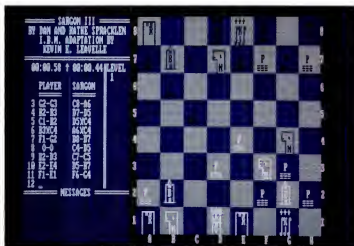
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ples of play. Ctrl-X cancels the replay mode for the problems, allowing you to try solving them for yourself.

Sometimes it is hard to avoid depression when a machine beats you at a familiar game like chess. But consider this: *Sargon III* can draw on a database of more than 68,000 completely analyzed positions, enabling it to achieve its high rate of victory over human players. This is by far the largest database of chess openings on a microcomputer program. So if you're going to lose, you might as well lose to the best.

On PC's scale of one to six, *Sargon III* rates:

FUN:	4.5
CHALLENGE:	5.5
SOUND/GRAPHICS:	3.5
TOTAL SCORE:	13.5



The major drawback of *Sargon III* is its rather confusing board graphics.

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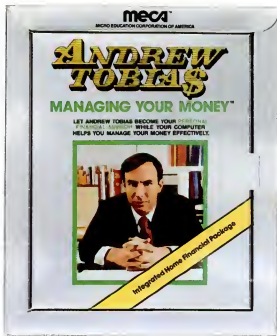
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PC Graphics and Sound: Unlimited Designs

Two primers show you how to create impressive graphics on your PC. One teaches the basics of video game writing; the other offers useful insights into the art and science of graphics.

The PC's graphics abilities have been highly acclaimed by many of its users because of its easy-to-use graphics language and wide variety of uses, ranging from kaleidoscopic displays of color and detailed business graphs to video games and animation. While beginners and experienced users alike can use the PC to create graphics, it does take time to develop your skills so you can make effective use of all the PC has to offer. Here are two books to explain all you need to know to create impressive graphics on your PC.

For the Novice

Graphics Primer for the IBM PC starts with a short history of computer graphics and then goes on to explain the funda-



Graphics Primer for the IBM PC
Mitchell Waite and Christopher L. Morgan

Osborne/McGraw-Hill
2600 10th St.
Berkeley, CA 94710
(415) 548-2805

Copyright: 1983

Cover Price: \$14.95; a program disk is available for \$29.95.

ISBN: 0-931988-99-3

CIRCLE 644 ON READER SERVICE CARD

mentals. Although the book is written for the novice and requires no special technical background, a knowledge of mathematics is helpful. A simple yet thorough and logical explanation of the way the



PC performs its graphics functions is included.

Waite and Morgan devote about one-fourth of their book to plotting and line drawing. Using a BASIC program segment, they describe and demonstrate the PSET, PRESET, LINE, and CIRCLE commands. The authors slowly and carefully guide you from one command to the next until even the most intimidating and complex commands have been explained

and rendered fully understandable.

As you run the BASIC programs from the book, you will find that you can generate some impressive graphics on your own. Waite and Morgan thoroughly explain the use of the DRAW and PAINT commands and show how the GET and PUT commands are used to place graphic images on the screen over a complex background, which has been previously constructed, without disturbing that background. One of the more interesting and useful programs is a "font editor" that lets you generate custom character patterns for the symbols represented by ASCII codes 128 to 255.

The *Graphics Primer* devotes an entire chapter to graphics on the IBM monochrome display. It lists several interesting programs, including one that generates a bar graph and another that lets you draw figures on the monochrome screen for later use.

The authors discuss the PC's graphics in depth in the chapter "Special Programming of the Color/Graphics Adapter." They discuss the actual programming of the 6845 Video Controller Chip in detail and give several BASIC programs that use the OUT and IN commands to program this chip.

Waite and Morgan also reveal "little-known" graphics tips, such as animation techniques, alternate hidden graphics

BOOK REVIEW

modes, character graphics editing, "getting" and "putting" images, and the IBM graphics definition language.

The *Graphics Primer* will definitely teach you about the graphics capabilities of the IBM PC. Its material is presented in small, easy-to-understand sections, and the examples are frequent and simple. And most importantly, the authors strive throughout the book to make sure you become as well informed about IBM PC graphics as they are.

Designing Video Games

Games, Graphics, and Sound for the IBM PC, by Strickland, Rockwell, and Bowyer, emphasizes the integration of graphics and sound during the design of a video game program. And, along the way, you will also learn how graphics and sound are generated and manipulated on



the PC. All the book's graphics and sound programs are written in three languages: DOS Pascal, FORTRAN, and BASIC.

Each of the book's four chapters has one section that relates its topic to BASIC programs and another that treats the Pascal and FORTRAN versions. Each chapter begins with a list of objectives that defines what you should be able to do when you finish the chapter.

The chapter on sound describes the three BASIC sound commands, BEEP, PLAY, and SOUND, and demonstrates the use of each with sample programs. Two commands, NOTE and TONE, are also explained; these commands generate sounds in DOS Pascal and FORTRAN, which have no sound-producing capabilities of their own.

As is appropriate for a book specifically written for the potential video game writer, the major portion of *Games, Graphics, and Sound* is dedicated to graphics and animation. All of the BA-

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BOOK REVIEW

SIC graphics commands are discussed and demonstrated with accompanying programs. The authors show different methods of moving an image on the

screen along with ways to move multiple objects simultaneously. Moreover, ways of detecting collisions between two objects on the screen, such as aliens and

rockets, are described in detail.

The three appendices include source listings for several Pascal and FORTRAN routines that you can use when you write programs in either of these languages to produce graphics and sounds that are not included in either DOS FORTRAN or DOS Pascal. The routines include "turtle graphics" routines for DOS Pascal that are very similar to the ones used by p-System Pascal. However, I must forewarn you if you want to key in the routines from the listings yourself: there are many pages of listings, and you must have access to the Macro Assembler since the listings are written in assembly language.

The *Games, Graphics, and Sound* optional program disk includes all of the routines discussed in the book as well as from the appendixes. Optional program disks are available in two language-specific versions. The DOS version lists for \$40, and the p-System version is available for \$30.

If you are a Pascal or a FORTRAN programmer and want to learn more about the PC's graphics and increase the graphics capabilities of your chosen language, this is the book for you. On the other hand, *Games, Graphics, and Sound* is also perfect for BASIC programmers who are simply interested in writing video games. ■

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Freehand Graphics

Two freehand drawing programs, PC Paintbrush and Dr. Halo, offer PC users graphics capabilities like those of the Apple Macintosh's much-acclaimed MacPaint program.



If you've been living on a remote island for the past year, you may not have heard of *MacPaint*, the freehand, mouse-controlled graphics program for Apple's Macintosh. In response to the splash *MacPaint* made in the graphic art world, several graphics programs that are veritable *MacPaint* clones are now available for the IBM PC. Two of these are *PC Paintbrush* by Z-Soft and *Dr. Halo* from Media Cybernetics.

PC Paintbrush

When you install *PC Paintbrush* with the monochrome display driver, an almost exact replica of the *MacPaint* screen will appear on your PC's screen.

At the top of the screen is a menu of options. The Undo option erases your latest work without clearing the drawing screen. Page accesses a pull-down menu that enables you, for instance, to save your current drawing to a file or retrieve a previously saved file. The Edit option's pull-down menu lets you either move or copy a part of the drawing from one location on the screen to another. The Font, Style, and Size options all access additional pull-down menus with which you can control and customize text to insert into the drawing. Misc. brings up the final menu, which lets you zoom in on a specific portion of the drawing, select the shape and structure of the lines drawn by

the "paintbrush," and edit and customize the color patterns.

The left side of the screen holds the tool box that represents the heart of *PC Paintbrush*. All drawing on the screen is done with one of the tools selected from this group of icons. Depending on which one you choose, you can draw, fill, airbrush, set type, or rearrange the drawing on the screen. To select a tool, you move the cursor to the tool and press the button on the input device. Beneath the tool box is a smaller box containing the five available drawing widths. When you draw unfilled objects (lines, boxes, airbrush, and circles), the width you select determines the thickness of the line you draw.

Finally, running almost the complete length of the bottom of the screen is the



PC Paintbrush

Z-Soft

Marketed by International Microcomputer Software, Inc.

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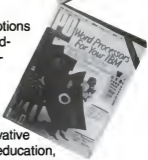
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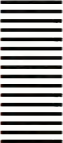
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DESIGN

available color palette and texture patterns, indicating the foreground and background colors you've selected.

PC Paintbrush requires a joystick or a mouse; the keyboard is used primarily to enter text. The program does, however, make use of eight of the ten function keys: four can "grid," or cross-hatch, the drawing area, two control the size of circles, and two lock in specific locations on the drawing area.

Despite its wealth of options, *PC Paintbrush* is simple to use. All you do is select a tool, a drawing width, and foreground and background colors, move the cursor to the drawing area, and draw. A reference card reminds you of the purpose of each function key and of each item in the tool box.



Dr. Halo
Media Cybernetics
7042 Carroll Ave.
Takoma Park, MD 20912
(301) 270-0240
List Price: \$99.95

Requires: 256K RAM, one disk drive, graphics card.

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Dr. Halo is harder to install and use than *PC Paintbrush*, and its manual is more technical. But since *Dr. Halo* is primarily an interface through which to access Media Cybernetics's sophisticated Halo graphics subroutines, it has more features than either *MacPaint* or *PC Paintbrush*.

When you enter *Dr. Halo*, the left-hand side of the screen displays a tool box similar to *MacPaint*'s. By moving the cursor to one of the icons in the box, you select the default mode of that drawing tool. The options for drawing-line style appear at the bottom left corner of the screen. The initial screen also includes the color and patterns palette.

Instead of pull-down menus, *Dr. Halo* has secondary tool boxes attached to some of the items in the main tool box.

For example, if you select the letter *a* icon by clicking the right-hand button on the input device, a secondary tool box will appear in the upper left-hand corner of the drawing area. Using this secondary tool box, you can select one of the eight available type styles, one of five type sizes, and one of the four type orientations. Alternatively, you can use the default or the previously entered settings by clicking the left-hand button.

Unlike *PC Paintbrush*, *Dr. Halo* will display all previously saved pattern palettes and drawing files. It lets you rotate either the complete drawing or any portion thereof. It will also fix or transpose right and left, or top and bottom, portions of a drawing.

In *PC Paintbrush* you can't vary the orientation of the text—all letters go left to right—but *Dr. Halo* lets you select either left to right, right to left, top to bottom, or bottom to top. The ability to orient letters horizontally is a great help in labeling charts and graphs.

Dr. Halo supports a wider range of input devices than *PC Paintbrush*: In addition to a mouse or joystick, it can handle input from digitizers, the Koala Pad, and the keyboard cursor control pad.

Special Features

Both products come with utility programs for creating slide shows and for importing and saving to a file a graphics-mode picture from another program. You can import a saved graphic image into the drawing software; the import utility can take a picture created by another program (for example, a 1-2-3 graph) and either load it into the drawing program for editing or use it in a slide show.

Dr. Halo and *PC Paintbrush* will both run with a number of different color boards. I tried each with both the IBM color card and the Tecmar Graphics Master card. The Tecmar card, because of its 16-color capacity, produces much better and truer color than the IBM card. When used with the Tecmar card, *Dr. Halo*'s

colors appear much sharper and brighter than the colors in *PC Paintbrush*. With the four-color IBM Color Card, both products' colors are of approximately equal quality, although *Dr. Halo* offers more colors and patterns.

Both programs work well with the Microsoft Mouse, and *Dr. Halo* also works well with the cursor control pad (although I wasn't able to draw curved lines with it). Both, however, had some problems with the Kraft Joystick I used to test them. Initially, the joystick moved the cursor too quickly in *PC Paintbrush*—the slightest movement caused the cursor to jump from one side of the screen to the other. Fortunately, Z-Soft provides a simple patch to slow down the joystick for the PC.

Another problem with using the joystick with *PC Paintbrush* is that after about half an hour the cursor begins to drift. The drifting is caused by the joystick and not by the program, and you can stop it using the joystick's flywheel controls. The joystick had even bigger problems with *Dr. Halo*: It stopped the cursor about an inch from the right and, more critically, the bottom margins. I therefore had to use the flywheel controls on the joystick to access the complete color and pattern palette. With the keyboard's cursor control pad, *Dr. Halo* worked fine.

Ask Yourself Why

Determining which of these two *MacPaint* clones is a better product for you depends upon why you want a free-hand graphics drawing program in the first place. If your primary goal is to produce professional-quality slides for business presentations, using *Dr. Halo* in conjunction with a color card with 16 or more colors (such as the Tecmar Graphics Master card) appears to be the superior choice. For more informal drawing, however, *PC Paintbrush* is the better choice. Its tool box and pull-down menus are much easier to use than *Dr. Halo*'s secondary tool boxes. ■

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For Doctors: Windows in the Office

IBM's medical office software is the first of its kind with windows. It also provides reports that other balance-forward systems lack. But are its innovations worth the blue-chip price?

IBM's medical office software, *Doctor's Office Manager*, reminded me of Erich Segal's *Love Story*.

What does a romance novel have in common with software physicians use to keep financial records and bill patients easily and efficiently? Though the technique seems innovative and clever and the product is fresh, the approach is clichéd.

A Fenestrated First

In one sense, *Doctor's Office Manager* is innovative: It's the first program of its kind with windows. An attractive square-overlaid-square effect lets you window in each library, making medical office billing a bit less boring. The attractive package made me optimistic, but my hope for the performance to match the display technique was in vain.

Setting up and getting comfortable



Doctor's Office Manager

IBM/Anson Corp.

P.O. Box 1328-S

Boca Raton, FL 33432

List Price: \$2,500, available at

IBM Product Centers

Requires: 256K RAM, one disk drive, and one hard disk.

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with the system are a breeze. The program provides plenty of on-screen help at the touch of the F1 key. A tutorial book and a reference book come with the disks, but you probably won't need either one; they contain little information not provided in on-screen prompts. You could have your system up and running the second day after purchase.

A tutorial disk lets you acquire experience with dummy data by running through a typical day using fictitious patients, procedures, and doctors; at the end, you can print the appropriate bills and reports.

Although you may enter only one charge at a time with the on-screen

charge form, the procedures entered during a single session are displayed in a window so that you can keep track of them. If you wish, you can have payment recorded at the end of charge entry and a receipt immediately generated. Payments cannot be attributed to specific charges, however.

Credits can also be entered easily through a separate menu choice. Previous charges appear in a window that you can scroll through if the number of lines needed to view them exceeds the space. Again, you cannot credit a specific charge with payment. Another feature permits you to batch under one title a group of separate charges always used

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MEDICINE

together. For example, if you include a CBC, chest X-ray, EKG, and urine analysis in a yearly physical exam, you can create a procedure labeled Physical. When you enter Physical, each of its

The system's use of balance-forward accounting prevents Doctor's Office Manager from being a heavyweight contender.

components will be listed in the files and on the bills as separate charge entries, which cuts some clerical work.

Reports include analysis by procedure, referring physician, and diagnosis, as well as the usual daily, monthly, and yearly financial reports.

One menu choice allows you to compose billing forms for different insurance companies and forms to submit directly to the patient. An encounter option displays previous charges and outstanding balances if you'd like to view those items when you see the patient.

Balance Backward

The attractive features lead, unfortunately, to a rather surprising letdown: The system uses balance-forward accounting (that's why you can't attribute payments to specific charges). It seems to me that this prevents *Doctor's Office Manager* from being a heavyweight contender.

Balance-forward accounting is adequate for physicians who perform a limited type or number of services for a patient, charge directly, and don't accept assignment or insurance billing. But in most medical fields, open-item accounting is preferable. An open-item system can keep track of which of several parties

have been billed for a service, how much each has already paid, and what remainder each owes.

Also disappointing is the limitation on when certain data can be entered: Only diagnoses, procedures, referring physicians, facilities, or insurance entities on file are acceptable to the system. No data can be added to any library while you're filling in a blank on screen, which means you must enter your information before you use the system. If you encounter a situation in which new information is needed, you'll have to stop and return to the library maintenance menu, where you can add the information to the appropriate library. Only then can you resume your task. Most newer programs have eliminated the annoyance of having to go back and forth like this.

Patients can be added only when creating a file. And if you enter a patient name already on file, the program won't warn you of the duplication.

Bells and Whistles

A Correspondence section permits you to send up to 99 different form letters to persons listed in the Referring Physician, Patient, or Mailings libraries. This feature may be useful for reminders of upcoming appointments or collections notices, but it is not a true word processing feature. You can also produce a Surgical Letter whose purpose can only be to tell a referring physician about a procedure performed on a patient. Because you probably have a word processing package with merged-print features for your other typing needs, this segment of the program is superfluous.

Another section, rather pretentiously labeled Clinical Management, allows you to print patient reports selectively, for instance, by specific diagnoses, procedures, insurance type, or guarantor. One type of report in this section, optimistically labeled "Medical Records," allows a meager one-line comment per patient per visit.

A security system that restricts access

to the program consists of three passwords, each of which allows system log-on, and a business password is needed to print certain financial reports. But once within the program, an operator can alter accounting information without an additional security check.

Like chrome on a car, these features may make the product look good but serve no other purpose. Often they just take up memory that could be used better—for example, allowing the library files to feed an add-on word processing program and database manager instead of having them clutter up the disk memory.

Complaints

The program's standard features are plagued by various problems. Only two insurance codes are permitted for each procedure, probably because only two insurance policies are allowed per patient. But two patients may have four different insurance companies so that a procedure may need more than two codes to satisfy the third-party payers. *Doctor's Office Manager* also lacks "type of service" and "place of service" mapping to let you fill in the codes automatically for third-party payers.

Daily cash and revenue reports must be verified manually. Although double-checking your figures is good practice, actually you should do that before entering the data. At this point it would make sense to let the computer use double-entry bookkeeping to check its own figures.

Doctor's Office Manager is an interesting program to look at and run, does a fair job, and adds a few bells and whistles (though not particularly valuable ones). It provides reports other balance-forward accounting systems lack (though most balance-forward systems cost half as much). You could live with its faults; so why am I so disappointed?

The Love Story Connection

About 700 medical office management programs are available for the IBM

PC. Most, though less flashy and produced on smaller budgets, do the job just as well and cost less. I had hoped for better from a company with IBM's re-

sources.

Which brings me back to *Love Story*. Does being IBM mean never having to say you're sorry? ■

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A PC Fights Class-Action Suits

Davis, Miner, Barnhill & Galland, a Chicago law firm, found a PC's help invaluable in class-action suits against Burlington Northern, Western Electric, Motorola, and the Chicago City Council.

The Chicago law firm of Davis, Miner, Barnhill & Galland recently acquired two new "partners" to assist its practice of highly specialized class-action discrimination suits. One member of this team is an IBM PC; the other is Whitman Soule, a computer guru with a social conscience. The two assist Davis, Miner in coping with a practice that requires more number crunching than any other in the country.

The firm also lays claim to winning the largest pretrial settlement in the history of the United States. The case, a class-action suit against Burlington Northern railroad, involved 9,000 claimants and required over 200 depositions. It also cost a million dollars in expenses—mostly computer charges. It was these figures that precipitated the firm's purchase of the PC. Davis, Miner ultimately settled the suit for a \$10 million cash award to the claimants and affirmative relief worth between \$8 and \$50 million.

The Burlington Northern case concerned race discrimination. The suit began in 1978 when several black retired dining-car waiters told Davis, Miner how they had been allowed to work only in the dining cars and had not been transferred to better jobs when the railroad eliminated the dining cars. They also had not been promoted beyond chief dining-car waiter. Thousands of Burlington



Northern employment records were used to bear out these charges.

This landmark case made it clear that statistical analysis and data storage and retrieval were to be a prominent part of Davis, Miner's practice, and so the firm began looking for someone to handle it. Jud Miner, one of the firm's partners, hired Whitman Soule as a consultant, and he now spends the majority of his time with the firm. Soule's first recommendation was to purchase a personal computer to act as a remote terminal to the mainframes at the University of Chicago and the University of Illinois at Chicago (Circle campus), which sell the firm computer time. The PC would also han-

dle internal data analysis and office administration.

The Setup

On Soule's recommendation, the firm purchased an IBM PC, an Epson FX-100 dot matrix printer, and a Hayes 1200B internal modem. Soule selected MicroRim's *R:base SERIES 4000* program for database management, *PMate* for text editing, *Multiplan* for a spreadsheet, *WordStar* for word processing, and *FYI 3000* for text management.

FYI 3000 has been particularly helpful in the firm's Montgomery Ward age-discrimination litigation. The program indexes and retrieves abstracts of the thousands of personnel documents used in the case.

The PC has also shown its potential with depositions. In fact, *FYI*, the manufacturer of *FYI 3000*, is in the process of customizing the program to handle large documents such as depositions. In a pilot project in Houston, the company has spent 3 years indexing 16,000 pages of testimony and court documents—20 megabytes of text—associated with a single case. Soule would like to see the deposition process completely computerized. "The court reporter would input the deposition onto a floppy disk, and we could just load it into the computer with an indexing program and review it. It

would cut down tremendously on cumbersome, space-consuming hard copy."

For cases in which the attorneys handle easily categorized documents of the same type, such as personnel application forms, want ads, or position descriptions, they move from the free-form *FYI 3000 to R:base SERIES 4000*. This fixed record database can be organized around dates or types of documents, and you can even code the documents to speed up search and retrieval.

Office Administration

Office manager Janet Knack and her secretarial and paralegal support staff use *R:base* to enter and retrieve data and to keep track of the lawyers' time and charges for each case. They also maintain case summaries and keep a general disbursements file. The firm uses the PC

for legal analysis just 3 days a week; the balance of the time the machine helps with office administration.

Soule explained the PC's role this way: "Obviously the PC can't handle the enormous amounts of raw data that serve as the basic body of research for most cases. That is taken care of by the IBM 3081 mainframe at the University of Chicago or the mainframe at the University of Illinois at Chicago. Some of our largest cases require tremendous storage; for instance, a suit involving Western Electric included a million-record database. However, we do use the PC as a remote terminal and bring over specific files for review and analysis." For statistical analysis, Soule uses *Systat* on the PC and *SAS* on the mainframes.

In one case, he said, the PC was used to calculate settlement options. "The

Motorola case was a class-action suit involving the company's failure to hire blacks over a period of time. The verdict was the largest that had ever been secured up to that point, with a settlement well over \$12 million. Doing the 'what if' analysis for that one ate up significant amounts of memory as well as time."

Council Wars

The *PMate* text editor proved a lifesaver in one of Davis, Miner's largest and most important cases. Partner Chuck Barnhill recalled, "Ketchum versus Byrne and the City Council of Chicago was a classic redistricting dispute. The City Council sat down and drew ward maps that disenfranchised blacks and Hispanics by 'gerrymandering' the dividing lines to create white voter majorities in wards all over the city, regardless

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of logical neighborhood boundaries or historical precedent. The courts decided in our favor, and some affirmative relief was obtained. We appealed for more relief, and that was granted; now the case is on appeal to the United States Supreme Court." The implications are clear: A decision in favor of the firm's position will swing the balance of power to Mayor Washington and his faction and away from Alderman Vrydolak's faction.

The PC played an important part in this case, too, according to Soule. "The data we needed to prove our contention came in on tapes in a report format that had all sorts of strange control characters generated by an obsolete system. It was impossible to use until I downloaded the files to the PC and used *PMate*'s keystroke macros to strip away the confusing controls and report structure."

PC Settlement

In a case against Local 134 of the International Brotherhood of Electrical Workers, attorneys at Davis, Miner used *Multiplan* to develop the settlement formulas and administer the settlement process. "When it came time for settlement, we set up a file on the PC of type of claimants," Soule explained. "We sent out forms to all 500 claimants, and as we received them back we entered the data on the PC. We were looking for the amount of time they worked compared with the time worked by an average white electrical worker with the same seniority. The formulas were developed on *Multiplan*, and the comparison data was downloaded from the mainframe or keyed in from the claim forms."

While the firm does not use the PC to generate graphics for courtroom displays

(those are handled by professionals), it frequently uses statistical graphics from the *Systat* program in its analyses. Soule uses scatter plots for analysis of residuals and regressions. He found them particularly useful in the Ketchum versus Byrne case.

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CIRCLE 239 ON READER SERVICE CARD

PC MAGAZINE • JANUARY 8, 1985

Up in Smoke

Traditional fire-fighting materials, such as water and powder, can be harmful to electronic equipment and magnetic media. An alternative is Halon 1211, a gas that leaves no stains or residue.



Fortunately, computer-facility fires are rare. But when they do occur, the impact can be devastating to enterprises of all sizes, especially if you use your computer setup to keep records for a business or organization. The cost of replacing your data, records, and software, not to mention the hardware itself, could easily total many thousands of dollars.

Large data centers can afford to invest in an elaborate, under-the-floor system to protect against fires. However, if you have a smaller data center, a data storage room, or just a PC with a hard disk, you should consider fire protection on a smaller and more affordable scale.

Traditional Techniques

Many traditional fire-fighting techniques, such as water or powder, are not advisable in a data or word processing environment. For example, your local fire code may mandate a sprinkler system for your entire building. But water has no place around delicate electronic equipment because it's not effective on burning plastic and other data-processing equipment materials and because it conducts electricity—causing a severe shock hazard. Water can also damage tapes and disks.

The extinguisher you choose for a particular application should reflect the type of fire risk and the amount of mess you

are willing to tolerate. Powder extinguishers are usually the least expensive and provide a reasonable amount of firefighting capability for their weight.

The most common and least-expensive powder extinguishers primarily contain pressurized sodium bicarbonate.

The powder is nonconductive (for Class C electrical fires) and very effective against household-type Class B fires, which usually involve chemicals or gases. When sprayed onto burning grease, the powder seals off the oxygen supply by combining with the burning matter to form a soapy scum. Clearly, this is not the type of extinguisher you should select to protect your delicate and expensive electronic equipment. The abrasive powder could ruin your magnetic disks. In addition, sodium bicarbonate is completely ineffective on Class A fires, which involve wood products.

The ABC Powders

Most local fire codes require powders labeled "all purpose," or "ABC," powders. Generally, they work by depriving a fire of oxygen by fusing with a heated surface to form a crust—still not exactly what you'd want on a disk. These powders are more portable than water but involve a much greater cleanup effort.

ABC powders are nonconductive, but

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too corrosive to be suitable for electronic fires. They fuse to the hot electrical contacts and resist cleanup efforts. In fact, problems might not show up until several months later, long after recovery and insurance settlement.

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Using Carbon Dioxide

The newer "clean-agent" extinguishers are recommended for fires that involve electronic equipment. The first

The newer "clean-agent" extinguishers are recommended for fires that involve electronic equipment.

clean-agent extinguishers used highly pressurized carbon dioxide, which fights fire by displacing oxygen with the chemical you exhale. Unfortunately, heavy cylinders must be used to safely contain the pressure, and additional maintenance is required because of the greater potential for leakage. Releasing the pressure discharges a very cold fluid (-100 degrees Fahrenheit), and although the fluid leaves no residue, there is a high risk of thermal shock to warm and delicate electronic components. A carbon dioxide extinguisher is effective on Class B and C fires, but not Class A fires.

The Best Fire Fighters

Currently, several chemicals in the Halon family are being promoted for fire-fighting purposes. These colorless, odorless gases extinguish fires without reducing visibility—and then evaporate, leaving no stains or residue. These gases can get into places that powders cannot.

Halon gases are strongly recommended for protection of equipment and areas that would be endangered by water or powders: computers and peripherals, tape and disk libraries, documentation libraries, and off-site data storage centers, even home computer setups, which might contain programs and files that would be difficult to replace.

Halon 1301 is an expensive chemical that is best reserved for situations in which the occupied area is to be flooded totally with gas to fight the fire. Under-the-floor systems for large computer rooms are the prime applications for Halon 1301. It has the best toxicity rating possible and is effective on Class B and Class C fires. Clearly, though, such an extensive system would be overkill in most PC environments.

A less-expensive alternative is Halon 1211. Its chilled vapor cools burning cellulose like water, yet it does not pose carbon dioxide's high risk of thermal shock because the discharge temperature is well over 0 degrees Fahrenheit. Halon 1211 displaces the oxygen that the fire needs and chemically interferes with the process of combustion to extinguish a blaze quickly. It is in the same toxicity class as carbon dioxide, which means that ventilation of enclosed spaces after its use is strongly recommended.

Halon 1211 is noncorrosive, nonconductive, and universally rated for Class B and Class C fires. Class A ratings can be obtained only with the larger-size extinguishers; in small quantities, Halon 1211 does not cool burning cellulose sufficiently to prevent re-ignition from stray sparks.

Although it is not as cheap as powders, Halon 1211 is more affordable than carbon dioxide and can be packaged in less bulky containers. I believe it is the best extinguisher to protect expensive or delicate electronic equipment and software media.

Bruce Gest, a freelance writer, specializes in safety and security topics.

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CIRCLE 290 ON READER SERVICE CARD

New On The Market

HARDWARE

NIU-130

A Net/One local area network interface unit (NIU) with two RS-232 ports. It features 128K of RAM and an Intel 80186 microprocessor for executing network communications protocols.

The NIU-130 comes in four versions—broadband, baseband, optical fiber, and thin coaxial cable—and includes an integral RF modem. The broadband version's modem transmits at 5 Mbps, the others at 10 Mbps.

(List Price: from \$1,400)

Requires: Net/One LAN.

Ungermann-Bass, Inc.
2560 Mission College Blvd.
Santa Clara, CA 95050
(408) 496-0111

CIRCLE 653 ON READER
SERVICE CARD

280 MB Internal Expansion Kit

A mass storage expansion kit for the IBM PC AT. The hard disk subsystem kit fits into the AT's casing and includes an integral 1/2-inch tape backup drive, all necessary cables, installation software, and a backup/restore utility.

The 280-MB hard disk allows individual data files of over 32 megabytes. It supports PC-DOS 3.0, QNX, PC/IX, Concurrent PC-DOS, USCD p-System,

PC-XT/370, 3270 PC, and all PC-compatible networks. It uses the AT's own hard disk controller for compatibility.

The tape drive can back up 65 megabytes of data in 12 minutes. Smaller expansion kits of 40-, 65-, and 140-MB capacities are also available.

(List Price: \$15,850)

Emerald Systems Corp.
4901 Morena Blvd.
San Diego, CA 92117
(619) 270-1994

CIRCLE 655 ON READER
SERVICE CARD

SKY320-PC Digital Signal Processor

An arithmetic and I/O coprocessor board for the

IBM PC. Based on the Texas Instruments TMS320 microprocessor, the SKY320-PC comes with two auxiliary 16-bit I/O ports, appropriate software, and either 16 or 64K four-ported memory.

The software includes a macro preprocessor, a TMS320 assembler, an interactive breakpoint debugger, and a library of mathematical primitives. The library permits convolution and matrix operations. There is also a C-compiler option available.

The SKY320-PC board is capable of processing real-time data, as well as custom video or other digital data, and the 16-bit

ports can be used to accelerate data transfer.

In addition to programming in C, applications range from image processing and analysis to electrical and mechanical CAD.

(List Price: 16K version, \$1,995; 64K, \$2,995; C compiler, \$500)

Sky Computers, Inc.
Foot of John St.
Lowell, MA 01852
(617) 454-6200

CIRCLE 658 ON READER
SERVICE CARD

MultiModem PC

A 300/1200-bps internal modem card and communications software package. The modem is compatible with Bell 212A, 103, and



280 MB Internal Expansion Kit, Emerald Systems Corp.

HARDWARE

112 standards, and all Hayes Smartmodem commands. It provides autodial and auto-answer capabilities, pulse or tone dialing, a repeat-last-command feature, and automatic parity selection.

The communications program, *MultiCom PC*, can address ports COM1 through COM4. It features a batch-file mode, the ability to define soft keys, and a set of macro commands for log-on sequences. It also accesses the PC's clock for timed, unattended dialing.

MultiCom PC can maintain a directory of 20 telephone numbers and related communication parameters, log-on procedures, and remote system commands. Files can be created, printed, and displayed both off- and on-line.

(List Price: \$549)

Requires: 96K RAM, one disk drive, PC-DOS.
Multi-Tech Systems, Inc.
82 Second Ave. S.E.
New Brighton, MN 55112
(612) 631-3550
TWX: 910-563-3610

CIRCLE 678 ON READER SERVICE CARD

Multigraph

A high-resolution monochrome and color graphics adapter board that is compatible with the IBM AT. It has a color resolution of 640 x 200, or 600 x 400 in 16 colors. Its mono-



MultiModem PC, Multi-Tech Systems, Inc.

chrome resolution is 720 x 350. An upgrade to 720 x 700 is also available.

Multigraph features 32K RAM, flicker-free scrolling, 32-bit internal architecture, and 132-column width. The board is compatible with 1-2-3 and *Symphony* and comes with a parallel printer port. (List Price: \$499; monochrome upgrade, \$50)
Profit Systems, Inc.
4655 Old Ironsides Dr. #400
Santa Clara, CA 95050
(408) 748-9551
Telex: 82-1321

CIRCLE 681 ON READER SERVICE CARD

Bullet-286

An Intel 80286-based replacement motherboard with identical dimensions and physical connections for expansion slots, keyboard, speaker, and power connectors as the PC-XT. The motherboard comes in three RAM models: 256K,

512K, and 1 MB. The 80286 CPU runs at a 6MHz clock speed (8-MHz version forthcoming) and can operate in real address mode with virtual machine emulation enabled for PC and XT compatibility or in protected virtual mode. It is claimed to be completely compatible with PC application programs and operating systems.

The Bullet-286 accommodates four different combinations of 64K and 256K RAM chips for up to 1 MB of on-board parity memory with zero wait states. Installed memory above 640K is used as kernel and disk cache memory. Because the printed circuit board provides only 18 mounting spaces for 150 nsec RAM chips, the additional memory configurations require Ansley piggyback sockets.

An on-board EPROM capacity from 16K to 64K

using 2764, 27128, or 27256 devices is provided. The 16-bit data path has one wait state, and the code execution is trapped to a virtual machine routine which emulates IBM BIOS. (List Price: 256K, \$1,995; 512K, \$2,295; 1 MB, \$3,995)

Wave Mate, Inc.
14009 S. Crenshaw
Hawthorne, CA 90250
(213) 978-8600

CIRCLE 682 ON READER SERVICE CARD

TW-3000 TECwriter

An electric typewriter that can double as a printer and interface with a modem. It features memory for up to 255 phrases or sentences, automatic memory correction, an LED display, and enhanced page formatting. Its 13,000-character memory is expandable to 29,000 characters and can be used with one-stroke operation.

The TECwriter includes automatic editing functions for moving and copying text, underscoring and boldfacing, reverse printing, and decimal tabulation and margin justification. Four pitches, including a proportional spacing, are available.

(List Price: \$1245)

TEC America
19250 Van Ness Ave.
Torrance, CA 90501
(213) 320-8900

CIRCLE 683 ON READER
SERVICE CARD

SOFTWARE

PortaAPL

An APL interpreter written in C. It contains a complete implementation of the standard APL language and allows programs to be moved from the IBM PC to other microcomputers.

PortaAPL features a full-screen editor, an ASCII mode, access to PC-DOS files from within the program, and a color or monochrome display. It also makes use of the 8087 math coprocessor and is compatible with the implementations of APL for the DEC VAX and Motorola 68000 systems.

The ASCII mode eases the transition for novice APL users and allows the interpreter to handle text-processing applications and access existing databases.

Graphics and I/O devices are also supported.

(List Price: \$195)

Requires: 256K RAM, one disk drive, PC-DOS, color or monochrome display adapter.

Portable Software
60 Aberdeen Ave.
Cambridge, MA 02138
(617) 547-2918

CIRCLE 659 ON READER
SERVICE CARD

DepoBank

An information retrieval service with context-sensitive on-screen help for lawyers, paralegals, and

phrases, and user-defined legal issue codes. The transcript can then be scrolled so as to locate the highlighted data.

Dictionary help and word-frequency analysis are also provided. The display consists of three windows: one each for displaying the text, entering search criteria, and recording notes. The note-taking window allows up to four lines of 80 characters for word processing. A directory of transcripts lists cases by name, witness, date of testimony, and in-



DepoBank, Text Sciences Corp.

judges. The service provides disk-based deposition, trial, and hearing transcripts. **DepoBank** stores up to 1,250 pages of text on a floppy, or over 20,000 pages on a 10-MB hard disk. The retrieval program is provided with the transcripts. Text can be searched with key words,

clusive page numbers.
(List Price: \$1.25 per page of transcript)

Requires: 256K RAM, one disk drive, PC-DOS.
Text Sciences Corp.
2716 Ocean Park Blvd.
Santa Monica, CA 90405
(213) 452-9114

CIRCLE 660 ON READER
SERVICE CARD

EasyLink Instant Mail Manager

An integrated access program for the EasyLink communications service. It provides a full-featured text editor, database and disk file management, and telecommunications.

The text editor indicates page width and file length, and its functions include search-and-replace and block moves. The database can maintain up to 100 names and addresses in a file.

EasyLink Instant Mail Manager also has a disk file manager which automatically saves transmitted messages for future use. The telecommunications program includes a one-keystroke procedure for logging on and can be used for accessing public database services and corporate mainframes.

(List Price: \$95)

Requires: 256K RAM, one disk drive, PC-DOS, 300- or 1200-baud modem.

Western Union
1 Lake St.
Upper Saddle River, NJ
07458
(201) 825-5000

CIRCLE 661 ON READER
SERVICE CARD

PC/Survival Kit

A set of four utilities for PC-DOS. The integrated utilities—**PC/Help**, **PC/Messages**, **PC/Keys**, and **PC/Colors**—support

Available
for IBM PC

What C did for Programming

Mark Williams has done for C Programming

The C Programming System from Mark Williams

MWC86 gets your C programs running faster and uses less memory space than any other compiler on the market. Then *csd*, Mark Williams' revolutionary C Source Debugger, helps you debug faster. That's The C Programming System from Mark Williams Company.

MWC86

MWC86 is the most highly optimized C compiler available anywhere for the DOS and 8086 environment. The benchmarks prove it! They show MWC86 is unmatched in speed and code density.

MWC86 supports large and small models of compilation, the 8087 math coprocessor and DOS 2.0 pathnames. The compiler features common code elimination, peephole optimization and register variables. It includes the most complete libraries. Unlike its competition, MWC86 supports the full C language including recent extensions such as the Berkeley structure rules, voids, enumerated data types, UNIX* I/O calls and structure assignments.

Quality is why Intel, DEC and Wang chose to distribute MWC86. These industry leaders looked and compared and found Mark Williams to be best.

User Friendly

MWC86 is the easiest to use of all compilers. One command runs all phases from pre-processor to assembler and linker. MWC86 eliminates the need to search for error messages in the back of a manual. All error messages appear on the screen in English.

A recent review of MWC86 in *PC World*, June, 1984, summed it up:

"Of all the compilers reviewed, MWC86 would be my first choice for product development. It compiles quickly, produces superior error messages, and generates quick, compact object code. The library is small and fast and closely follows the industry standard for C libraries."

csd C Source Debugger

Mark Williams was not content to write the best C compiler on the market. To advance the state of the art in software development, Mark Williams wrote *csd*.

csd C Source Debugger serves as a microscope on the program. Any C expression can be entered and evaluated. With *csd* a programmer can set breakpoints on variables and expressions with full history capability and can single step a program to find bugs. The debugger does not affect either code size or execution time. *csd* features online help instructions: the ability to walk through the stack; the debugging of graphics programs without disturb-

ing the program under test; and evaluation, source, program and history windows.

csd eases the most difficult part of development — debugging. Because *csd* debugs in C, not assembler, a programmer no longer has to rely on old-fashioned assembler tools, but can work as if using a C interpreter — in real time.

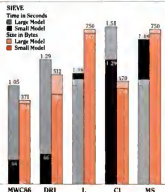
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The C Programming System from Mark Williams delivers not only the best C compiler for the 8086 but also the only C source level debugger. That's why it does for C programming what C did for programming. The Mark Williams C Programming System gives the programmer the MWC86 C compiler and the *csd* C Source Debugger for only \$495. Order today by calling 1-800-MWC-1700. Major credit cards accepted.

Technical support for The Mark Williams C Programming System is provided free of charge by the team that developed it.



Mark Williams Company
1430 W. Wrightwood Ave.
Chicago, IL 60614

*Unix is a trademark of Bell Laboratories.

SOFTWARE



EXCALIBUR PLUS, Armor Systems, Inc.

hard disks and RAMdisks.

PCiHelp provides the user with on-screen messages for commands. Along with the command's syntax and purpose, appropriate examples and hints are displayed.

PCiMessages supplies on-screen error messages for failed commands. Recommendations for corrective action are also given.

The last two utilities are new commands for PC-DOS. **PCiKeys** permits the user to program the ten function keys for commands or batch files. **PCiColor** allows the user to set the display attributes on either a color or a monochrome monitor.

(List Price: \$39.95)

Requires: 64K RAM, one disk drive, PC-DOS.

Relational Solutions, Inc.
8723 Woodleigh Dr.
Houston, TX 77063
(713) 530-4161

CIRCLE 663 ON READER SERVICE CARD

EXCALIBUR PLUS

A multi-user accounting system that includes its own command processing language, called ARC, and built-in networking capabilities. The 12 integrated modules comprising the EXCALIBUR PLUS system, available as separate programs, include the following: *General Ledger, Accounts Payable, Accounts Receivable, Billing, Payroll, Inventory, Counter Sales, Order Entry, Work in Process, Purchase Orders, Depreciation, and Customer Information.*

ARC is a task-oriented rather than a procedural language. It allows access to such application programs as *dBASE II, Framework, Symphony*, and *1-2-3* for extended capabilities. On-line help messages are included.

(List Price: Customer Information and Depreciation, \$395 each; all oth-

ers, \$695)

Requires: 128K RAM, 5-MB hard disk, PC-DOS.
Armor Systems, Inc.
324 North Orlando Ave.
Maitland, FL 32751
(305) 629-0753

CIRCLE 664 ON READER SERVICE CARD

IMiGIT

A color graphics and text editor program for the PC-EYE video image grabber board. The software enhances captured images with color and text and allows the creation of composite displays through the use of a cut-and-paste feature.

IMiGIT's icons include the ability to fill, draw, paint, move, duplicate, and recolor. Other features allow choice of colors, patterns, line widths, six type faces, and airbrush densities, as well as the ability to zoom for editing individual pixels. Gray-scale and color range can

be set to 1, 2, 4, or 6 bits per pixel. Curves can be drawn automatically from plotted points, and text can be sized and angled as desired.

The software can be used with a mouse, digitizer pad, or cursors. An option allows the menu to be moved from side to side or removed completely, leaving the entire screen free for the image.

(List Price: \$250; with PC-EYE, \$695)

Requires: 256K RAM, one disk drive, PC-DOS, color adapter board, color monitor, PC-EYE board.
Chorus Data Systems

6 Continental Blvd.
P.O. Box 370
Merrimack, NH 03054
(603) 424-2900

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A PC version of a main-frame applications development tool. **WYLBUR/pc** can



IMiGIT, Chorus Data Systems

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 - Formatting Routines for DOS.

10 MB \$745.00
20 MB \$1095.00



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DS/DD
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SOFTWARE

handle a variety of applications, from software integration and front-ending to computer-assisted instruction and telecommunications. It is compatible with TSO, OBS WYLBUR, CICS, VM/CMS, and other mainframe systems.

WYLBUR/pc includes its own full-screen editor and a BASIC-like programming language for program development, screen formatting, and file handling. The program also permits simultaneous access to multiple working files, 200 open random files, and subdirectories.

The development software includes a RUN command that invokes other language and application programs and then returns control when done and a CHECKSUM function for file transfers. Programmable function keys are supported, and up to 256 user-defined commands or series of commands are allowed.

(List Price: \$550)

Requires: 128K RAM, one disk drive, PC-DOS. *OBS Software*
115 Sansome St.
San Francisco, CA 94104
(415) 391-9555

CIRCLE 669 ON READER SERVICE CARD

Rx30 Pharmacy Software System

A complete pharmacy and prescriptions management system consisting of four



Rx30 Pharmacy Software System, Transaction Data Systems, Inc.

integratable modules: *Prescription Processing*, *Starter Data Base*, *Accounts Receivable*, and *Nursing Home Support*. Only *Prescription Processing* is required; the other modules are optional and expand the capabilities of the basic system.

Prescription Processing handles prescription filling/refills, patient profiles, allergy/drug interaction checks, generic drug substitutions, inventory management, third-party billing plans, and the printing of bottle labels. The software allows up to 99 different drug pricing schedules and can access patient, doctor, or drug records alphabetically for convenient searches.

Starter Data Base provides the basic system with a database of 2,300 drugs and 200 SIGs. *Accounts Receivable* provides for open-item or balance-forward methods, and allows

both prescription and non-prescription items to be posted to accounts.

For pharmacies supporting a nursing home, the *Nursing Home* module provides for batch prescription processing, medical distribution sheets, and other required documentation. Additional services available to Rx30 users include a drug-price updating service and toll-free telephone support.

(List Price: Basic system without optional modules, \$995)

Requires: 192K RAM, 10 MB hard disk, PC-DOS 2.0. *Transaction Data Systems, Inc.*
5750 Major Blvd.
Orlando, FL 32819
(305) 351-1210

CIRCLE 693 ON READER SERVICE CARD

SoftShell

A full-screen user interface providing direct access to the UNIX operating system

on the PC-XT. The interface simplifies UNIX's hierarchical file and command structure by supplying templates and context information while maintaining the system's piping and I/O redirection capabilities. It also acts as a menu-driver and screen-handler.

SoftShell splits the screen into two areas: the window and the scroll. The window displays the commands, arguments, templates, and descriptive information. The scroll is used for entering commands.

The interface also provides two new commands: YELP and LSLs. The former groups UNIX commands by function and presents them and other information in a window. The LSLs command provides a structured guide through the contents of the UNIX file system. Normal and highlighted panels are used to scan the tree structure, distinguish between directories and sub-directories, and locate files. You can also annotate UNIX's file names.

(List Price: \$295)

Requires: 128K RAM, 10-MB hard disk. PC/IX. *Logical Software, Inc.*
17 Mt. Auburn St.
Cambridge, MA 02138
(617) 864-0137
TWX: 910-997-3974

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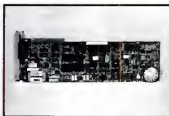


QIC-01. 10 MB internal hard disk subsystem at \$725.00.



Our half-height 10 MB hard disk comes complete with controller, cables, drive and easy to follow instructions. It fits inside one of your floppy slots and draws same amount of current as a floppy. It is compatible with DOS 2.0, 2.1 and 3.0 without any patches. In fact, you can simply boot up from the hard disk. This is the same disk you see advertised for hundreds of dollars more.

QIC-03. 300/1200 baud internal modem. \$275.00.



This auto dial/auto answer plug-in modem lets your PC talk to the world with reliable and easy operation. It is FCC certified, Bell 103/212 compatible as well as fully Hayes compatible. You can run all the popular communication programs as well as our superior QIC Com software program.

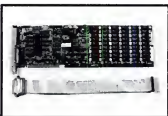
Our QIC-Com software program provides phone list management as well as powerful file transfer capabilities. You can even run any DOS programs such as WordStar concurrently without having to disconnect your line. Priced at \$45.00, it is an offer you don't want to miss.

QIC-04. Half-height floppy. \$129.00.



This half-height floppy is the quietest drive on the market. It draws the least amount of current and is compatible with your PC's floppy controller card. It's double sided, double density.

QIC-05. Five function card. \$199.00 (64 K RAM Set \$36.00).



Our five function card includes memory expansion from 0 to 384K, one serial port, one parallel port, one game port and one battery back-up clock/calendar. RAM disk, print spooler and clock utilities are included too.

QIC-06. Color/Mono display card coming soon...

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**QIC RESEARCH
INCORPORATED**

528 Valley Way
Milpitas, CA 95035

V-SPELL

A full-featured, menu-driven spelling checker and corrector that is compatible with *WordStar* and other word processing programs. The checker contains a 60,000-word main dictionary made up of the most often-used and commonly misspelled words.

V-SPELL highlights suspected misspellings in ten lines of text and provides up to 60 alternative spellings. The user can also call up the main dictionary to locate words.

(List Price: \$125)

Requires: 64K RAM, two disk drives, PC-DOS or CP/M-86.

CompuView Products, Inc.
1955 Pauline Blvd.
Ann Arbor, MI 48103
(313) 996-1299
Telex: 701821

CIRCLE 673 ON READER
SERVICE CARD

The Plain Vanilla Stock Portfolio Systems

Three separate investment-tracking programs designed for different levels of need and expertise. All three programs—*Plain Vanilla I, II, and III*—offer on-screen instructions and allow 50 transactions per security. *Plain Vanilla I* has a portfolio capacity of 50 securities; the other two can maintain records for 100 securities each.

Plain Vanilla I, The Investor, features security purchase and sale maintenance, current holdings and values reports, profit-and-loss statements, and the ability to update records for new tax laws.

Plain Vanilla II, The Manager, adds the ability to record call option transactions and compute their yields. It also allows up to 10 portfolios to be kept on one disk.

Plain Vanilla III, The Professional, extends beyond *I* and *II* by including an on-line quote retrieval capability. Other added features are the ability to record and display cash dividends and stock dividends and splits.

(List Price: *Plain Vanilla I*, \$99.95; *II*, \$129.95; *III*, \$159.95)

Requires: 64K RAM, one disk drive, PC-DOS; *Plain Vanilla III* also requires a subscription to Dow Jones News/Retrieval and a Hayes Smartmodem.
Iris Communications, Inc.
660 Newport Center Dr. 735
Newport Beach, CA 92660
(714) 720-0800

CIRCLE 667 ON READER
SERVICE CARD

SongWright, Version 2.0

An enhanced version of the *SongWright* music processing program that permits the user to compose, save, edit, play, and print



The Plain Vanilla Stock Portfolio Systems, Iris Communications, Inc.

music on a PC. New features include bass and treble clefs, multiple staves and voices, all time and key signatures, and an extended 4½-octave range for complex scores.

(List Price: \$39.95)

Requires: 128K RAM, one disk drive, PC-DOS, Epson or Gemini graphics printer.

SongWright
928 Filmore St.
Denver, CO 80206
(303) 321-0481

CIRCLE 696 ON READER
SERVICE CARD

BRaille-TALK

A software package that translates standard ASCII text files into modified files for Braille printing. It also supports a variety of voice synthesizers, has context-sensitive onscreen

help, and is designed for use by both sighted and blind users.

With *BRaille-TALK*, the user can translate a file, specify the Braille format, and then print the text on any number of low cost Braille printers. The format features the ability to print Braille in columns and includes such options as headers, page numbers, and margins. The voice synthesizer feature reads out the mnemonic menus and all keyboard entries. (List Price: \$95)

Requires: 128K RAM, one disk drive, PC-DOS, Braille printer.
Computer Aids Corp.
4929 S. Lafayette St.
Fort Wayne, IN 46806
(219) 456-2148

CIRCLE 685 ON READER
SERVICE CARD

ScreenPLAY

A screen-design program that takes full advantage of the capabilities of monochrome monitors. It enables the user to easily draw static or animated screens; up to 240 screens can be chained together for a single presentation.

ScreenPLAY allows up to 199 ASCII characters to be used in creating screens. Its utilities permit the use of created screens with a user's own FORTRAN programs.

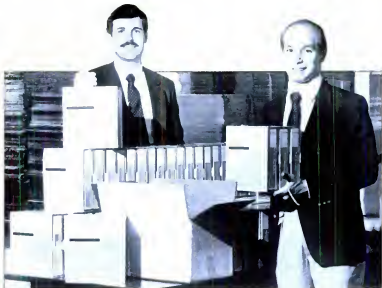
(List Price: \$35)

Requires: 192K RAM, one disk drive, PC-DOS. Frontier Software, Inc. 1110 S. 124th St. W. Allis, WI 53214 (414) 257-1175

CIRCLE 692 ON READER SERVICE CARD

Mr. Matrix

A utility for linear-algebra courses and linear programming that can multiply, invert, transpose, and manipulate up to 25 matrices. The software program is capable of handling both real and complex entries, as well as those entries which contain the finite fields of order p , p -squared, 8, 16, or 27. Mr. Matrix tests matrixes for being orthogonal, symplectic, or unitary. It also calculates determinants and can find some eigen values of matrixes with real entries.



Smart Software System, Innovative Software, Inc.

(List Price: \$20)

Requires: 64K RAM, one disk drive, PC-DOS. Polygonal Publishing House 210 Broad St. Washington, NJ 07882 (201) 689-3894

CIRCLE 690 ON READER SERVICE CARD

Smart Software System

A modular, integrated system written in C, consisting of a word processor, spreadsheet with graphics, and a database management system. The modules, which can be used as standalone programs, offer windowing, three levels of operation for varying degrees of expertise, an open-ended design for custom application development, and a "project pro-

cessing" feature that allows the user to run a set of tasks with one keystroke.

The Smart Spreadsheet with Graphics program allows for relationally based data to be entered in a 999-column by 9,999-row format. The graphics include 3-dimensional bar charts; high-low charts; pie and cake charts; line, point, and scatter graphs; and histograms.

Smart Word Processor provides on-screen text representation, custom definable fonts, and automatic, continual reformatting. Other features include the ability to box text with built-in graphic character sets, undo deleted text, write footnotes, and use math and decision functions.

The relational Smart

Data Manager runs under its own menus, customized menus, and a built-in command language. It features up to 10 "screen views," with a maximum of 15 pages per view, and offers password entry at both screen and file levels. Its windowing feature permits multiple files to be viewed for updating, and file manipulations can be done within a file, between files, and during report and form generation.

(List Price: Smart Word Processor, \$395; others, \$495 each; all three, \$895)

Requires: 256K RAM, two disk drives, PC-DOS. Innovative Software, Inc. 9300 W. 110th St., 380 Overland Park, KS 66210 (913) 383-1089

CIRCLE 672 ON READER SERVICE CARD



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INFOCOM

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CPM Versions: SCALL

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Initide	31.99	Zork I	27.99
Planetfall: Seastaller	ea27.99	Zork II-III	ea31.99

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Media Male 5 1/4" Holds 50	12.99
Media Male 3 1/2" Holds 30	11.99
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Printer Stand-Small	24.99
	10 100
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Dysan 5 1/4" DS/DD	37.99 359.99
Maxell 5 1/4" SS/DD	22.99 209.99
Maxell 5 1/4" DS/DD	37.99 359.99
Memorex 5 1/4" SS/DD	41.99 399.99
Memorex 5 1/4" DS/DD	19.99 189.99
Memorex 5 1/4" DS/DD	26.99 259.99

HARDWARE

AST I/O Plus	SCALL
Mega Plus II 64K	269.99
Six Pack Plus 64K	279.99
MODEMS Hayes 300 Baud	209.99
Hayes 1200 Smartmodem	479.99
Hayes 1200B Modem	409.99
Novation 103 Smart Cat	169.99
Novation 103/212 Auto Cat	399.99
NOVATION Access 1-2-3	439.99
Expansion Module	29.99
ORANGE MICRO Chipmunk	359.99
Mir Chips-4 Functions	116.99
PLANTRONICS Color Plus	375.99
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Princeton Max-12	189.99
Quadram Quadchrome RGB	529.99
Taxan 12" Amber #121	169.99
Taxan 12" Green #121	159.99
Taxan 420RGB Hi-Res	439.99
PRINTERS Epson FX80	499.99
Epson RX80	329.99
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RIBBONS FX, MX, RX80	4.99
FX, MX, RX100	7.99
TG Joystick	44.99
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MONOGRAM Dollars & Sense	109.99
FOR THE BUSINESS	
ASHTON TATE dBASE III	474.99
Encyclopedia	59.99
Frame Work	474.99
Friday	184.99
CONTINENTAL Ultrafile	119.99
CROSSTALK	139.99
LIFETREE Volkswart Deluxe	219.99
MICROSOFT Multitran	165.99
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MULTIMATE	379.99
PFS File Graph Write	99.99
Report	89.99

MicroPro

Infostar	259.99
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Wordstar Pro	349.99
Pro Options Pack	181.99

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Story Machine	23.99

KOALA

Muppet Learning Keys 59.99

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SOFTWARE • ACCESSORIES

HP-PC

A calculator utility which emulates the Hewlett-Packard HP-11C calculator. The program provides over 80 primary and 25 special operations. It stores data in 100 registers, and all 4 stack registers can be displayed.

HP-PC provides trigonometric and hyperbolic functions and permits the calculation of probability and statistical data. Operations include single-step debugging, alphanumeric messages, pause for input, indirect addressing, loops, arithmetic tests, and control of 10 flag bits. Calculations may consist of 500 operations, 100 labels, and 20 levels of subroutines.

(List Price: \$39.95)

Requires: 64K RAM, one disk drive, PC-DOS.

Sunderland Software Associates

1200 S. Catalina, #401
Redondo Beach, CA 90277
(213) 540-2567

CIRCLE 687 ON READER
SERVICE CARD

DFDdraw

A color graphics program designed for drawing data flow diagrams. Output can be sent to an Epson FX-100 or FX-80 printer or an H-P plotter.

DFDdraw uses a template containing the graphics symbols necessary for creating the diagrams. A function-key-driven menu

positions, connects, and annotates the symbols with text. The diagram's dimensions can be scaled and sized, and pan and zoom features support the drawing of large diagrams.

(List Price: \$500)

Requires: 256K RAM, one disk drive, PC-DOS, color monitor, color/graphics adapter.

McDonnell Douglas Automation Co.
P.O. Box 516
St. Louis, MO 63166
(800) 325-1087
(314) 233-8997

CIRCLE 670 ON READER
SERVICE CARD

ACCESSORIES

VISION

An interactive training course for UNIX and C using the PC and a videodisc. Three courses are divided into 37 units: **UNIX Overview**, 6 units; **UNIX Fundamentals**, 15 units; and **C Language Programming**, 16 units. The course covers such UNIX topics as the commands, the shell, communicating with the system and other users, files, pathnames, "cd," file access permissions, and I/O. The C Language Programming course includes control statements, data-type conversions, arrays, pointers and addresses, process library functions, and

structures and unions.

(Quantity One Price: \$924 per unit; **ITS Interface Controller**, \$2,400)

Requires: 256K RAM, two disk drives, RGB monitor, color-graphics adapter, videodisc player, ITS Interface Controller. **Interactive Training Systems, Inc.**

4 Cambridge Center
Cambridge, MA 02142
(617) 497-6100

CIRCLE 675 ON READER
SERVICE CARD

PC Action Station

A movable, collapsible computer workstation made of plastic laminated wood.



PC Action Station, Global Computer Supplies

It accommodates a keyboard and CPU unit, printer and paper, and includes storage space for diskettes and program materials.

The PC Action Station rolls on 2-inch dual-wheel carpet casters and features a sliding shelf for the keyboard, a drop-leaf shelf for documents, a concealed outlet strip with a master power switch, and a cork-board for messages or notes. The 56-inch wide unit collapses to a volume

ACCESSORIES • PUBLICATIONS

measuring 28 x 2 1/4 x 3/8 inches, and is available in putty or walnut finishes.

(List Price: \$575)
Global Computer Supplies
45P S. Service Rd.
Plainview, NY 11803
(800) 8-GLOBAL
(516) 292-3400

CIRCLE 654 ON READER
SERVICE CARD

SPEC Connector

A device that prevents illegal use of a program or data diskette while allowing unlimited backup copying. The small device plugs into the computer's serial port, permitting access to a system only when it is in place.

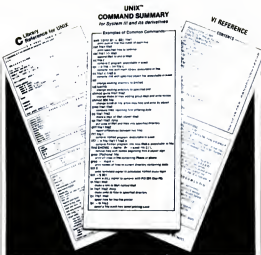
The SPEC Connector, when accompanied with a password, decodes encrypted data files. More than one device may be piggybacked to accommodate various applications, while leaving the port free for other devices. It draws power from the port and uses less than 1K of memory.

(List Price: \$29.95)
Secom General
26111 Evergreen Rd.
Southfield, MI 48076
(313) 354-3073

CIRCLE 656 ON READER
SERVICE CARD

AP-SWITCH

A pair of switch boxes for selecting one peripheral from three connected to the same port. Two models of the switch are available.



UNIX Pocket References, Specialized Systems Consultants

The AP-SWITCH-3S is RS-232C serial (DB-25) compatible; the AP-SWITCH-3P is used with Centronics parallel (36-pin D) connected devices.

Both units are bidirectional, thereby allowing more than one computer to be hooked up to one peripheral. Devices are accessed by sliding a selection lever to the appropriate position.

(List Price: AP-SWITCH-3S, \$100; AP-SWITCH-3P, \$120)

Apropos Technology
1071-A Avenida Acaso
Camarillo, CA 93010
(805) 482-3604

CIRCLE 677 ON READER
SERVICE CARD

UNIX Pocket References

A set of six printed reference cards listing the commands for the BSD 4.2,

System III, System V, and System VI versions of the UNIX operating systems, as well as one for the C programming language and the C Library of System III. Each card lists the commands alphabetically, showing details of the command's syntax and options.

(List Price: \$2.50 to \$6, depending on version)
Specialized Systems Consultants
P.O. Box 7, Northgate Sta.
Seattle, WA 98125
(206) 367-UNIX

CIRCLE 695 ON READER
SERVICE CARD

PUBLICATIONS

The Lawyer's PC

A fortnightly newsletter focussing on the computerized law office. The Lawyer's PC is a 16-page

publication with a 4-page advertising supplement. It provides reviews of hardware and software, lists of vendors and books, news and events columns, and field reports received from subscribers.

(Subscription Price: \$58 per year)

R.P.W. Publishing Corp.
P.O. Box 1108
Lexington, SC 29072
(803) 359-9941

CIRCLE 676 ON READER
SERVICE CARD

1-2-3 Tips, Tricks, and Traps

A 270-page guide for Lotus's 1-2-3 written by Douglas Cobb (the author of *Using 1-2-3*) and Dick Anderson. The book presents some common problems with the popular spreadsheet program and various hints and techniques to overcome them.

The traps mentioned in *1-2-3 Tips, Tricks, and Traps* cover some of the program's specific shortcomings and are usually accompanied by techniques for solving them. The hints demonstrate alternative ways of using the spreadsheet's commands and functions.

(Cover Price: \$14.95)

QUE Corp.
7999 Knue Rd., #202
Indianapolis, IN 46250
(317) 842-7162

CIRCLE 662 ON READER
SERVICE CARD



Apple to IBM PC Conversion Guide, Scott, Foresman & Co.

The C Programming Tutor

A tutorial-like handbook, written by Thomas O. Sidebottom and Leon Wortman, for the C programming language. It covers pointers, arrays, variables, error handling, type conversions, conditional expressions, logical and relational operators, and I/O. In addition to explanations and applications, the book provides a number of programming exercises and examples. Two of the programs included are *EPSET*, an Epson printer configurator, and *XREF*, a C program cross-reference listing utility. (Cover Price: \$17.95) Robert J. Brady Co. Bowie, MD 20715 (301) 262-6300

CIRCLE 680 ON READER SERVICE CARD

Apple to IBM PC Conversion Guide

An 80-page handbook, written by Richard Steck, for converting Apple programs and peripherals for PC use. The how-to guide covers the Apple II family and the IBM PC and XT.

In addition to help in converting Apple BASIC to IBM PC BASIC, the book deals with adapting existing Apple peripherals for the PC. Attention is also given to the differences in graphics and file operations. Recommendations on configuring the PC and purchasing additional hardware are offered. (Cover Price: \$11.95) Scott, Foresman & Co. 1900 E. Lake Ave. Glenview, IL 60025 (312) 729-3000

CIRCLE 657 ON READER SERVICE CARD

SERVICES

PC PLUS

A service providing the user with access to an IBM mainframe for data storage. The PC user can store data on the mainframe, download only that amount needed for analysis or updating, do his work on the PC, and then upload the revised information. It uses SNA/SDLC communications protocol at up to 4,800 bps, interfaces with spreadsheet software, and provides a storage capacity for up to one-half million records.

At the PC level, the PC PLUS system consists of an IBM SNA 3270 Emulation and RJE Support pack-

age, a Bell 201C compatible modem, menu-driven NPL (nonprogramming language) Information Management System software, and an SIS interactive/offline data request formatter. A *VisiCalc* interface maintains the model calculations during transmission.

(One-User License: \$3,500)

Requires: 256K RAM, two disk drives, IBM SDLC Communication Adapter.

SUNDATA Information Systems

2 Glenhardie Corporate Ctr.
1285 Drummers Ln.
Wayne, PA 19087
(215) 341-8788

CIRCLE 674 ON READER SERVICE CARD

New on the Market Submission Guidelines

1. Please include the retail price, distribution methods, and details of both hardware and software requirements needed for an end-user to properly use your new product. For software especially, this includes required amount of RAM, number and type of disk drives, operating system(s) supported, and any peripheral equipment needed.
2. Releases should be typewritten double-spaced on one side of the paper. Copies of advertisements for the product may be included, but in most instances we need more information about a product than is typically included in an ad.
3. Include telephone contacts for marketing and technical questions.
4. If available, include black-and-white glossy photos of the product, 4 x 5 in. or larger.

Please note that all products are run on a space-available basis. It is impossible to guarantee publication of a product announcement for any particular issue.

Inclusion in **New on the Market** is at the exclusive discretion of the editor.

PC User Groups

This list is a partial directory of PC user group names and addresses. Use this listing to locate other PC aficionados who congregate in your area or around the world.

COLORADO

Denver User Group
c/o Steve Leibson
4040 Greenbriar Blvd.
Boulder, CO 80303
(303) 494-4062

PC Users' Group of Colorado
c/o Howard Weissman
P.O. Box 944
Boulder, CO 80306
(303) 443-5528 (evenings)

Colorado Springs PC Users Group
c/o Cleveland Bell
P.O. Box 16256
Colorado Springs, CO 80935

Front Range PC User Group
c/o Joan Brown
813 Engleman Pl.
Loveland, CO 80537
(303) 667-6059

CONNECTICUT

Connecticut IBM PC Users Group
c/o Davis Foulger
P.O. Box 291
New Canaan, CT 06840
(203) 744-4002



IBM PC Club
c/o Colette B. Squires
P.O. Box 545
Storrs, CT 06268

Trumbull PC Users Group
P.O. Box 545
Trumbull, CT 06611

Central Connecticut User Group
c/o Rich Paterson
ComputerLand
131 S. Main St.
West Hartford, CT 06110
(203) 561-1446

S.E. Connecticut PC Users Group
c/o Catherine Winslow
P.O. Box 180
W. Mystic, CT 06388

Yale Medical School IBM PC User Group
c/o Philippe Jeanty
School of Medicine
333 Cedar St.
P.O. Box 3333
New Haven, CT 06510
(203) 785-2173

DELAWARE

PC Professional Users Group
P.O. Box 2350
Wilmington, DE 19899

DISTRICT OF COLUMBIA

IBM PC Special Interest Group
4910 43d St., N.W.
Washington, DC 20016

Financial Institutions Users Group of the D.C. Metropolitan Area
c/o Gary Eiserman
First American Bank, N.A.
740 15th St., N.W.
Washington, D.C. 20005

PC will publish a periodic listing of PC user groups. Send new addresses or address changes to "Club News," PC, One Park Ave., New York, NY 10016. New groups and address changes are shown entirely in **boldface**.

CLUB NEWS

FLORIDA

IBM Personal Computer Users' Group

c/o Wyatt Bell
The College of Boca Raton
3601 N. Military Trail
Boca Raton, FL 33431

USF IBM PC (MS-DOS) User's Group

University of South Florida
4202 E. Fowler Ave., SVC 409
Tampa, FL 33620

Space Coast PC User Group

c/o John Key
1540 Monte Carlo Cou.
Merritt Island, FL 32952

Central Florida Computer Society IBM/MS-DOS Special Interest Group

c/o Nick Konya
P.O. Box 639
Goldenrod, FL 32733
(305) 896-7100

Charlotte County PC Users' Group c/o W.K. Millholland 2775 Luna Ct. Punta Gorda, FL 33950

PC Users Group
c/o Charles Chaney, Jr.
P.O. Box 5772
Jacksonville, FL 32207
(904) 272-8547

PC Users Group of Boca Raton
c/o Richard Sandell
P.O. Box 273421
Boca Raton, FL 33427
(305) 278-6959

Northern Florida Amateur Computer Club

c/o Stephen D. LeBar
10921 Kuralei Dr.
Jacksonville, FL 32216

ORANGE PC
c/o John Momberger
P.O. Box 8005
Orlando, FL 32856
(305) 855-7343

Pinellas IBM-PC Users Group
3401 Gandy Blvd., Lot #628
Pinellas Park, FL 33565
(813) 576-2608

Miami PC User Group, Inc.
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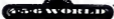
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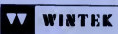
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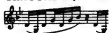
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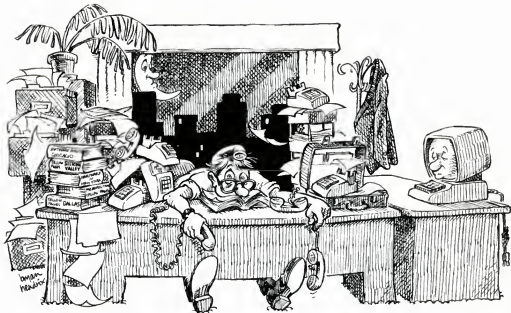
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Keyboard Codes

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If you press the A key either on a conventional typewriter or on the PC keyboard, you expect the A character to be produced. But the PC keyboard has additional keys for extended functions, such as the ten function keys, the cursor movement keys, and the Del and Ins keys. These extended functions request actions rather than generate characters.

Each key on the PC or PC-XT keyboard has a designated physical position, numbered from 1 (Esc) through 83 (Del). (There is an 84th position [SysReq] on the new PC AT.) When a key is pressed, it generates a scan code, which is the same as its position number, though it is expressed in hexadecimal notation. Thus, pressing the Esc key produces 01H; Del generates scan code 53H. (A second set of scan codes—made by adding 80H to the first—is generated when the key is released, but the PC does not seem to use



these latter codes.) Any program can determine the source of any keystroke by using the scan codes. When you press the A key, the computer actually gets two pieces of information: the scan code for the letter A (1EH) and, of course, the ASCII character code for A (41H). The table in Figure 1 shows the scan codes for some common extended functions.

Keyboard Input

A simple request for input of one character from the keyboard involves setting the AH register to zero and requesting DOS interrupt 16H:

```
SUB AH,AH      ;set MOV AH,00
INT 16H        ;request keyboard input
```

The operation responds in one of two

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PROGRAMMING

ways, depending on whether you pressed a character code or an extended function code.

Suppose that the key you pressed represents a displayable character, such as a letter (A through Z), a number (0 through 9), or a symbol such as !, @, #, or \$. The INT operation delivers the ASCII character code to the AL register and the scan code to the AH register. Thus, pressing the letter A puts character code 41H in the AL register and also places 1EH in the AH register.

For most purposes, the character code in the AL register is the only information your computer needs. Suppose, however, that the key you press represents an extended function code, such as one of the ten function keys or a cursor arrow key. For these noncharacter requests, the operation sets the AL register to zero and inserts the scan code in the AH register.

Consequently, when an INT 16H instruction is used to request a keyboard entry, the program can then test the AL register. If it is nonzero, the request is for a character code. If it is zero, the request is for an extended function code.

The following instructions test if an INT 16H operation has returned a zero value to the AL register:

```
SUB AH,AH
INT 16H      ;request input
CMP AL,00    ;extended function code?
JZ exit1     ;yes -- exit to routine
```

You probably have noticed that certain characters, such as +, -, and *, appear twice on the keyboard. To the PC, each of these similarly labeled keys is quite different. The plus symbol puts the character code 2BH in the AL register and one of two scan codes in the AH register. If the plus key pressed was in the top row above the equals sign (=), the scan code is 0DH. If the plus key pressed was at the far right, the scan code is 4EH.

In the following routine, if the character is a plus sign (2BH), the logic tests for the scan code:

```
CMP AL,2BH   ;plus sign?
JNE exit2    ;no -- exit
CMP AH,4EH   ;which scan code?
JE exit3
```

Extended function	Hex scan code
Alt/A - Alt/Z	1E - 2C
F1 - F10	3B - 44
Home	46
Up arrow	48
PgUp	49
Left arrow	4B
Right arrow	4D
End	4F
Down arrow	50
PgDn	51
Ins	52
Del	53

Figure 1: Selected keys and their hexadecimal scan codes.

Directing the Cursor

Following is a simple example that sets the cursor to row 0, column 0, if you press the Home key (scan code 47H). Interrupt 10H, for setting the cursor, requires 02 in the AH register, zero in BH, the row in DH, and the column in DL:

```
SUB AH,AH      ;clear AH
INT 16H        ;request input
CMP AL,00      ;extended function?
JNE exit4      ;no -- exit
CMP AH,47H     ;scan code is Home?
JNE exit5      ;no -- exit
MOV DX,00      ;set row/col to zero
MOV AH,02      ;set AH to 02
SUB BH,BH      ;set BH to zero
INT 10H        ;set cursor
```

A program can respond to a scan code in many different ways. The example above interprets the Home key to mean that the cursor is to be set at row 0, column 0. But a program can respond with any other action or can even ignore the key-stroke entirely.

A program could make further tests for scan codes. The function keys deliver scan codes 3BH through 44H, respectively. Following is a test for function key F1:

```
CMP AH,3BH    ;function key f1?
JE exit6      ;yes, exit
```

Here again, a program could perform any designated action for a user request.

Suppose that a program stores the current row/column setting for the cursor in fields named ROW and COL, respectively. You press the down arrow to request moving the cursor down one row. The following program segment moves the cursor, provided that ROW is not already at

24, to the bottom of the screen:

```
SUB AH,AH      ;request input
INT 16H
CMP AL,00      ;extended function?
JNE exit1      ;no -- exit
CMP AH,50H     ;down cursor?
JNE exit2      ;no -- exit
CMP ROW,24     ;bottom of screen?
JAE exit3      ;yes -- exit
INC ROW        ;increment ROW by 1
MOV AH,02
SUB BH,BH
MOV DH,ROW
MOV DL,COL
INT 10H        ;set cursor to 00,00
```

Since it is the program that interprets the scan codes, you could intentionally or erroneously cause the down cursor key to perform any other action, even to move up the screen!

For further reference, the complete technical details for all scan codes as well as the use of the Shift, Ctrl, and Alt keys are available in the *IBM PC Technical Reference* manual, in the Keyboard Encoding and Usage section. The character codes are listed in Appendix C.

Assembler Exploring

To see how this works, you can type in the short assembly language program below, using the A (Assemble) command of the DEBUG mini-Assembler. (If your version of DOS is earlier than 2.0, you will have to enter the actual machine code with the E (Enter) command, as detailed shortly.) When you use the A command in DEBUG, the code will automatically begin at 100H. After the last instruction, just press Enter a second time to exit from the assembler. The source program is very short and consists of just three instructions:

```
SUB AH,AH
INT 16H
JMP 100H
```

The INT 16H instruction requests input from the keyboard. After you enter a character, the JMP instruction returns you to the beginning, creating an endless loop. Normally, you would scrupulously avoid this practice; however, DEBUG provides a simple way out of the program.

To enter the program directly in

PROGRAMMING

machine language (a necessity if you have DOS 1.x), insert your DOS diskette in drive A: and boot up in the usual way. When the DOS A> prompt appears on the screen, type DEBUG and hit the Enter key. When the DEBUG hyphen (-) prompt appears, use DEBUG's E command to enter the three instructions in hexadecimal machine language. Type these instructions *exactly* as they appear, including the blanks. Hit the Enter key at the end of each line.

E CS:100 28 E4
E CB:102 CD 16
E CB:104 EB FA

The CS stands for Code Segment, the area for executable code. The values 100, 102, and 104 are the relative locations within the CS where each of the three two-byte instructions begin. The normal starting location of the first instruction in the Code Segment is 100H.

The values 28 E4, CD 16, and EB FA are the actual machine code for each of the three assembly language instructions. Before attempting to execute this program, make sure that you have keyed each entry exactly as shown (you can repeat any line that contains an error). On completion, type R and then hit the Enter key to display the starting instruction. The operation displays the contents of the registers in hex (irrelevant at this time) and the first instruction:

3B33:0100 28 E4 SUB AH,AH

The first four hex digits, 3B33 (which is actually 3B330), indicate the address of the beginning of the Code Segment, but your version will probably differ from this value. The rest of the line should be identical, however.

You should now press T and then hit the Enter key to trace execution of the next instruction. The screen should display

3B33:0102 CD 16 INT 16

The computer is now about to execute the interrupt instruction. If you wanted, you

could trace the operation through the entire BIOS routine, but for this exercise, it's as well to execute right through the INT operation and stop at the JMP instruction that follows at 104. To do this, type G 104 and hit the Enter key.

The program should stop with the cursor blinking, waiting for the keyboard input that INT 16H has requested. Type a lowercase letter a. The program should accept this character and immediately display the registers and the next instruction. Your interest is only in the contents of the AX register, which should be 1E 61. 1EH in the AH register represents the scan code for keyboard position 30 (the letter a), and 61H in register AL represents the ASCII code for a.

The instruction that displays should be

08F0:0104 EBFA JMP 0100

Press T and then hit the Enter key to execute the JMP instruction, and enter G 104 again to execute the interrupt. This time, type an uppercase A. The AX register will now contain 1E 41.

You can continue indefinitely by repeatedly using T and G 104. Try entering a variety of keyboard entries, such as

A program can respond to a scan code in many different ways or can even ignore the keystroke entirely.

Esc, Ins, Del, F1, Home, cursor keys, both plus signs, both minus signs, and numbers. A few keys, such as Shift by itself, do not cause the keyboard to produce a code.

When you've had enough scan codes for one session, you can exit from DEBUG by typing Q (for Quit) instead of T or G 104.

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User-to-User

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Counting Bytes

Ever want to know how many files and bytes are taken up in a subdirectory? (Around the PC office, we use XyWrite II-plus for such jobs; when you ask it to list the files in a directory, it reports how many characters are in that directory. This sterling word processor can also handle filename wildcards and all 255 IBM PC characters, which makes it a super program editor. And Peter Norton's new set of utilities will count this for you, too.) While DOS doesn't offer any utilities to do this for you, the KOUNTER.BAT batch file (see Figure 1) and the BYTER.BAS program (see Figure 2) will. The trick is to redirect the subdirectory's directory listing into a file (here called FIL1), weed out the lines that don't have byte counts in them, zero in on the actual byte counts, and add them up.

The Comma Dilemma

BASICA and DOS insist on comma-less integers, but it's hard to read a nine- or ten-digit number that's run together without commas. While BASICA offers a PRINT USING statement that can insert commas in the right places, it requires that you tell it how many digits are in each number you print. If you specify a PRINT USING string that is too small, BASICA will print a percentage sign at the head of the number, but this looks terrible. The



common solution is to use a very large PRINT USING string (for example, the string "#####") for all entries, but this will pad the left side of smaller numbers with unnecessary spaces, which also looks bad. The solution is to count the number of digits in each number you want to print this way and include a PRINT USING string that matches the length of the number. However, you can't just use eight tic-tac-toe signs for an eight-digit number, since such a number will eat up two more # signs because of the two commas it will gain. The DEF FN statement (see Figure 3) takes care of all this. Once defined, this function can insert the proper number of commas (without wasting any spaces) at any point by including the FNU\$(num) in the appropriate PRINT USING statement.

(continued)

```

echo off
if %1 ==      goto warn
goto g
:warn
echo You forgot to specify a subdirectory
goto end
:g
dir %1>fill
basica byter
goto end
:end

```

Figure 1: A batch file to count the number of bytes in a subdirectory (see Figure 2 for the BASICA program it calls).

```

100 ' *** subdirectory byte counter ***
110 '
120 DEF FN#(NUM)=RIGHT$(STRING$(20,35)+"",
LEN(STR$(NUM))-FIX((LEN(STR$(NUM))-2)/3))
130 LOCATE 11,22:PRINT "Now counting individual file lengths"
140 OPEN "FILE:" FOR INPUT AS #1
150 '
160 ' *** skip volume and path info at top ***
170 '
180 A$=INPUT$(1,#1)
190 IF A$=CHR$(13) THEN K=K+1
200 IF K=4 THEN 250 ELSE 180
210 '
220 ' *** read listings one by one ***
230 '
240 TOTNUM=0
250 C$=""
260 FOR K=1 TO 41
270 B$=INPUT$(1,#1)
280 IF K=2 THEN IF B$=CHR$(32) THEN 350
290 IF B$=CHR$(13) THEN 320
300 C$=C$+B$
310 NEXT
320 IF MID$(C$,15,1)="" THEN 250 ELSE F=F+1:LOCATE 13,39:PRINT F
330 NUM=VAL(MID$(C$,16,7)):TOTNUM=TOTNUM+NUM
340 GOTO 250
350 CLS:LOCATE 11,10
360 PRINT F;"files totalling:"
370 PRINT USING FN#(TOTNUM);TOTNUM;
380 PRINT " byte (excluding subdirectories)"
390 SYSTEM

```

Figure 2: A BASICA program to count the bytes in a subdirectory (see Figure 1 for the batch file that calls it.)

50-Line Screen

The program 50LINES.BAS (see Figure 4) puts 50 lines of 80 characters on an RGB monitor. While you can't use LOCATE statements and the characters are not well defined, this trick can be very useful. The function key redefinitions in lines 110 and 120 show you how to move the cursor through the lower 25 lines; by hitting F9 and then F10, you print 51 carriage returns on the 50-line screen.

John Higgins
Panama City, Florida

You can insert a screen like this in the middle of a program to wake up the viewer. There are all sorts of ways to program the 6845 graphics chip at the heart of your color graphics adapter to produce similar magic. Both PC Magazine and its sister publication PC Tech Journal have run articles on this, and such books as the Waite/Morgan Graphics Primer for the IBM PC contain decent explanations and samples. The 6845 is capable of far more than its limited BASICA repertoire, and programming it is pretty simple.

Word Imperfect

I was a bit disappointed by the testing done in PC's review of word processors (see PC, Volume 3 Number 17). My office has also been testing several packages and we have had numerous "technical difficulties."

Most packages have had minor problems, but we feel Microsoft's *Word* holds the award for destructiveness. To test *Word*, we put it on our Santa Clara hard disk and tested it both alone and in a network. Under PCnet 2.21, not only does *Word* not let you save or update files, but it actually *eats the originals!* We were a little upset. There were no TEMP files, BAK files, or originals lurking about anywhere to even reconstruct the file from scratch.

If you do try to save a file, it will ask you to enter a Y to retry access to the BAK file, and at this point, you're dead. You can't enter Y, and you can't enter anything else, so you must reboot to get out. But don't worry, by this time, all your files, including the original, are already gone. The horrifying thing is that you think everything is working fine until you do the save. *Word* loads fine. You can edit, etc., but you can't save your work. At this point, you're lucky if you can exit without rebooting.

We called Microsoft about this problem, and a spokesperson said they don't support *Word* running under anything but straight PC-DOS. I can think of at least three hard disks that replace the PC's BIOS with their own rather than giving you a device driver, but I guess these systems aren't straight PC-DOS. Does this mean you can't run *Word* on hard disks that do not provide a device driver?

I spoke to some other users of PCnet with newer versions, and discovered that their versions of PCnet work fine with *Word*, so this is not as awful as it sounds—unless you are using PCnet 2.21. If you are using an old version of PCnet, you may want to get your system updated before purchasing *Word*. If you have any doubts, be sure to try *Word* on a file you don't care about before you put it

USER-TO-USER

up on any networks.

Another problem occurs if you are using the public domain BAT.COM to extend the batch utilities—don't use it before you bring up *Word*. It creates a sticky cursor. You can't move around to edit or choose a command, and sometimes you must reboot to exit *Word*. This problem didn't occur every time we executed BAT.COM before *Word*, but when we did have a sticky cursor, we were able to get rid of it by rebooting and not executing BAT.COM. If we forgot and used a batch file with BAT commands in it, the sticky cursor would reappear.

We do like *Word* for editing. It has a lot of potential, but it loses something when it eats your originals. We have used *Word-*

Microsoft does not support Word under anything but straight PC-DOS.

Star under conditions you wouldn't believe (networks, remotely through a BBS, on strange and wonderful equipment), and although we may have occasionally lost our edits, we never, ever lost an original.

If you just happen to have more pull with Microsoft than the Internal Revenue Service does—we tested *Word* in the Consulting Services Branch of the IRS—then try to convince the company that deleting originals does not represent an improvement in word processing. Maybe Microsoft should handle its files the way venerable *WordStar* does. It may be old-fashioned, but the process works.

Amy J. Goebel
Alexandria, Virginia

The rule is, never buy it until you try it. Unfortunately, it's hard to (1) get a copy to test without having your dealer or the manufacturer think you're going to buy a disk duplication machine and go into busi-

```

100 * PRUSING.BAS -- prints numbers with commas
110 DEFDL N
120 DEF FNUE(NUM)=RIGHT$(STRING$(20,35)+",",
    LEN(STR$(NUM))+FIX((LEN(STR$(NUM))-2)/3))
130 INPUT "Enter a number: ",NUM
140 IF NUM=0 THEN END
150 PRINT USING FNUE(NUM);NUM
160 GOTO 130

```

Figure 3: A program to input numbers without commas and then print them out later with commas in the right places—without adding unnecessary leading spaces.

[illegible]

Figure 4: A program to put 50 lines of 80 characters each on a color graphics screen. Note that the normal LOCATE statement will not work on the lower 25 lines.

ness selling bootleg copies, and (2) try the software long enough to shake all the bugs out. We try to be as thorough as we can, but we obviously can't test every configuration, especially unusual ones with less than the very latest version of software/firmware. Moreover, Microsoft can't be faulted if its products don't work on every configuration, but the company or your dealer should happily offer you a refund. This problem won't be solved until software and hardware manufacturers get together and agree to hammer out standards, or until IBM gets so big and all-

pervasive that it sets every last de facto standard itself.

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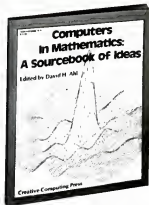
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PC Tutor



COMMAND on Demand

Q: I have an add-on hard disk made by Pegasus that uses a WINDRIVE device driver with which I must boot the operating system from the A: drive. I've noticed that at the end of some programs, COMMAND.COM must be loaded from the boot drive. If drive A: doesn't contain a disk with the COMMAND.COM program, the computer waits until I put in such a disk.

Is there any way to tell DOS 2.1 that C: is the boot drive? I've loaded COMMAND.COM as the first entry in the root directory of C:—will that help?

Ernst W. Chabron
Raytown, Missouri

A: When this problem came up before in PC Magazine, someone explained how to use DEBUG to alter the COMMAND.COM program so that DOS could be told to reload the system from C:.

I won't recap that method here because I have serious qualms about recommending that approach. For example, it ruins the process DOS uses to determine if COMMAND.COM has been overlaid. I think that using DEBUG to alter DOS is always a risky operation—solving problems that way is a bad habit to acquire.

A much simpler method is to use the COMMAND interpreter itself. In your situation, you need to type:

COMMAND C:

This statement runs a new version of COMMAND.COM and, at the same time, instructs the system henceforth to look to C:\ (the root directory on the hard disk) when it needs to restore the command interpreter.

Fortunately, DOS 3.0 has fixed this problem once and for all. DOS 3.0's SET COMSPEC= command works adequately, more or less as documented.

Hungry Disks

Q: With my work, I usually fill up a 320K floppy disk within a week. This seemed a considerable rate of consumption, so I checked to see if I had been wasting disk space.

I found that at least 1,024 bytes are used each time I create a new file, even if a file only contains a single byte.

This result inspired me to write a complex program with DOS and BASIC to sum up all the bytes on the disk that are actually used by my files. After I ran this program, it stated that I had used only about 26K (this includes the .COM files) on a disk. The DIR command, however, stated that there were "0 bytes free."

What kind of trickery is embedded in this phenomenon?

Masahiro Kyushima
Okinawa, Japan

A: Yes, DOS does allocate storage on double-sided disks in 1,024-byte chunks, a desirable amount for fast disk access with minimal directory complexity.

You could reduce that amount to 512 bytes per chunk, but this solution would

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PC TUTOR

introduce problems of its own. Even so, your disks would still fill up quickly.

It sounds as if you create many very tiny files. For more efficient space allocation, try collecting some of these files into larger files where possible.

In any case, the results of your test seem extreme. Perhaps one of your programs is not freeing up storage correctly? A program might have been written so that it erases a file without actually releasing the storage originally allocated for that file.

If you suspect this is what happened, try running CHKDSK, which will search through your disk's allocation table and look for discrepancies. CHKDSK will notify you when it finds some supposedly unused chunks that were not freed up.

In DOS 1.0 and 1.1, CHKDSK will free any wasted disk storage automatically. With DOS 2.0 and later versions, you must explicitly instruct CHKDSK to free

If you create many tiny files, for more efficient space allocation, try collecting some of these into larger files.

up space by calling for the program this way:

CHKDSK /F

This command says, "Check this disk's files for any storage that belonged to old erased files and free up the wasted space or make the space accessible by giving it a new filename."

Mono Designs

Q: When I write applications programs using Pascal and CP/M-86, I'd like to

include simple graphics that could appear on an IBM PC's monochrome screen. For example, the monochrome graphics displayed by IBM's Exploring the IBM Personal Computer are adequate for my needs.

I plan to write assembly language sub-routines that can be run in my Pascal programs, since I have an assembler and am already comfortable with assembly language. What I need is technical information on how to address the pixels in the monochrome display to create graphics like IBM's.

Eric H. Van Tassell
Pine Bush, New York

A: IBM's monochrome adapter provides very limited graphics capabilities, no matter what programming language you choose to use. But if what you see satisfies your needs, then you're in luck.

The monochrome display presents characters from a set of 256 symbols in a 25-line by 80-character format. Although you can't address individual pixels to create graphics, some of the 256 characters were specifically designed for constructing charts and tables. Once you know which numbers identify these symbols and how to place these values in the display memory, you should be able to program the graphics you want.

The IBM monochrome adapter has 4K of memory, located at segment B000h. When you POKE numbers into these addresses, the corresponding characters are displayed on the screen. Two bytes are devoted to each character-size screen position. The first byte identifies one of the 256 possible characters; the second byte, called the attribute byte, controls features of that character's appearance, such as brightness, underlining, inverse video, and blinking.

For example, address B000:0000 contains the character displayed in the top-left corner, while B000:0001 contains the attribute byte for that character. You can use this general formula to find the decimal address for the character byte of a giv-

PC TUTOR

en row and column position:

$$2 * ((\text{row} * 80) + \text{column})$$

If the hexadecimal equivalent of this number is xxxx, the actual address is B000:xxxx.

You make the simplest graphics with just two different characters—a space and

IBM's monochrome adapter provides very limited graphics capabilities, no matter what programming language you choose to use.

a solid block—arranged in a 25 × 80 grid. The blank space character is ASCII value 32, and the solid block is character 219. Thus, to display a solid block at row 5, column 8, you would place the value 219 at address B000:0330, because

$$\begin{aligned} 2 * ((5 * 80) + 8) \\ = 816\text{decimal} \\ = 330\text{hex} \end{aligned}$$

To erase this solid block from the screen, just POKE the value for a space (character 32) into the same address.

This method permits 25 × 80 resolution graphics. A little more care allows you to create more detailed designs using four additional characters—ASCII numbers 219 through 223—that fill in only the top, left, right, or bottom half of a character-size space.

219
220
221
222
223



These permit graphics with either 50 × 80 or 25 × 160 resolution; the IBM character set doesn't include several other patterns that full 50 × 160 graphics would require.

You can, however, go beyond the simple graphics that are created with these six building blocks. IBM's 256 monochrome characters include 40 line-drawing symbols (ASCII numbers 179 through 218) that fit together to make borders and frames. You can also use these characters for more intricate effects.

Your IBM computer's *Technical Reference* manual has tables with details on these monochrome graphics characters.

Selective Files

Q: *Is there any way to list only the filenames that have a .BAS extension with a FILES command issued from BASIC? Although I could put all the BASIC program files in one of the hard disk's subdirectories, I'd rather not because there are novice users here who may not know how to use DOS's file structure.*

In the same vein, is there a way to view the file directory selectively while in WordStar? Would this method require modifying the DIR program in DOS?

Dennis M. Grant
Visalia, California

A: With BASIC's FILES command, you can use file specs and wildcard characters (?) and *, just as you do with the DIR command in DOS. To view only your BASIC files, you can use this command:

FILES "*.BAS"

I know of no similar approach, however, that can be used within WordStar.

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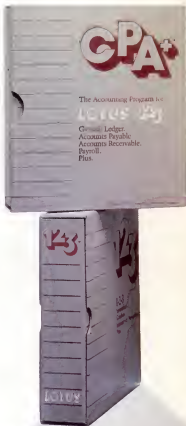
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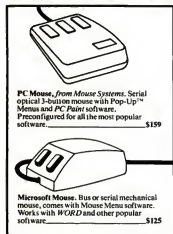
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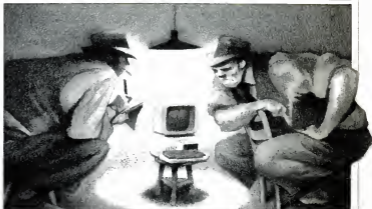
It can take you weeks to root through on-line databases for the facts that you need tomorrow. Information brokers such as Information On Demand will do the searching for you in a matter of hours.

I don't do my own plumbing anymore. Instead, I call in a professional. In my old age, I've learned that sometimes it just makes good sense to hire someone with the knowledge, skill, experience, and special tools needed to do a job quickly and efficiently.

The same logic applies in the field of electronic information retrieval. As more and more computer owners are discovering, having a large chunk of the world's information at your fingertips is one thing, but being able to find the facts and figures you need when you need them is something else. Simply deciding which databases to search can be a major challenge. Once you've made your selections, you may find that you'll have to open accounts on a number of different systems to gain access to the databases you've targeted. And each is sure to have its own conventions and command language, both of which are essential and time consuming to master.

Professional Searchers

Calling in a professional is often the only sensible answer. How do you locate a professional on-line searcher? You might try the Yellow Pages under Information or Research, but you would be better off asking a librarian for a copy of *Information Industry Marketplace*, a directory published by R. R. Bowker in



New York. You might also contact the American Society for Information Science (ASIS) in Washington, D.C., at (202) 659-3644. This is the main trade association for "information brokers," as professional research firms are sometimes known.

The services offered by such firms will vary. Some are equipped for any query, while others specialize in certain subjects such as chemistry and chemical engineering or history and social science. Some rely on on-line systems exclusively, while others draw upon printed materials and telephone interviews as well.

Most brokers can supply you with the same abstracts and citations that would

have appeared on your own screen had you conducted the search yourself. If you have access to an electronic mail system, you can usually obtain the material electronically. Many firms can also supply photocopies of the source material from which the on-line abstracts were derived. In the trade, this service is called "document delivery."

Information On Demand

One full-service information gathering company is Information On Demand (IOD). Founded by Sue Rugge in 1971, IOD has nearly 70 full-time employees handling more than 500 information and document delivery requests a day.

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"We regularly access DIALOG, BRS, Orbit, Nexis and Lexis, Westlaw, Dow Jones, Pergamon's InfoLine, NewsNet, and many other databases here and abroad," Rugge says. "But we also have full-time IOD employees stationed in more than 20 major libraries around the country." All IOD employees hold master's degrees in library science, and a number of them are certified as medical or law librarians as well.

"The M.L.S. is important, of course," Rugge says, "but I don't think it's the most crucial requirement. To be a good on-line searcher you need two things. First, you've got to do it all the time. There's just no substitute for experience. And second, you've got to be able to 'think on your seat' when using an on-line system. Not everyone can do this. I've seen top-flight print researchers simply freeze up when confronted with a terminal and a search language."

The process at IOD begins with a client query; initial contact with IOD is often made electronically. If you're a Source subscriber, you can obtain information on the company's services by keying in HELP IOD at the Source Command Level; you can then contact the company by sending SourceMail to TCB352. On CompuServe, you key in GO IOD for information and send E-Mail to 76703,316. DIALOG users should go into one of the ONTAP files (the least expensive on the system) and key in .ORDER ITEM INFO to send a message to IOD. IOD's BRS mail address is TJ52. On SDC's Orbit the command is ORDER IOD. And, of course, you can always contact IOD by phone during regular business hours (the toll-free number is (800) 227-0750; in California, call (415) 644-4500).

A query form is available in the IOD information sections of The Source and CompuServe, but the space is rather limited. Your best bet is to ignore the form and simply send the firm an electronic letter outlining your request.

"Basically, we need to know as much

about what you want to know as possible," Rugge advises. "Tell us how far back in the literature you want to go, and let us know if you want only English abstracts or some or all other languages. If it's a medical question, tell us whether you want treatments, descriptions, causes, research, or information."

All IOD employees hold master's degrees in library science, and some are certified law librarians as well.

Once IOD has a handle on your request, the company will respond with a firm quote within 24 hours and ask for a deposit equal to half of the budget that you are authorizing. The up-front deposit is required only the first time you use the service; after that IOD will bill you or automatically charge your credit card (American Express, MasterCard, Visa, or Diners Club).

IOD charges \$60 an hour, plus database connect time and related costs, and there is a 2-hour minimum per query. According to Rugge, the total cost of a typical on-line search "is between \$200 and \$300, though the actual figure will depend upon the complexity of the search, the number of databases that must be accessed, and similar factors." Volume discounts are available, and Source and CompuServe users receive a 20 percent discount on the labor charge the first time they use the service. (IOD charges are not billed to your Source or CompuServe account.)

The turnaround time varies, but 4 or 5 days is typical. For a surcharge of \$60, however, IOD offers a super-rush same-day service that can be as fast as 2 hours if the information can be delivered electronically.

Paying Dues

IOD's charges are not out of line. Indeed, some firms charge \$75 an hour or more for similar services. When you consider how valuable the right information can be in business, however, or what it would cost you to obtain it on your own (even assuming you had access to comparable resources), \$200 or \$300 can seem like a real bargain.

"We do a lot of work for attorneys, management consultants, advertising agencies, public relations firms, and others who need precise information in a wide range of subject areas on a regular basis," Rugge says. "Mailing lists are another popular item, particularly for people who are starting their own businesses or companies interested in sending out market research questionnaires."

The range of requests that IOD is called upon to handle is highly varied. People who have been diagnosed as having a particular disease have used IOD to obtain more information about it. At least one Source user asked IOD to find information on the jobs for French-speaking people available on cruise ships.

A growing number of people are also taking advantage of IOD's document delivery service. From an annual report to an article in the *Hungarian Journal of Electronics*, if it exists on paper, IOD's staffers can almost certainly locate a copy for you. The citation can be from a footnote in a book you're reading or something turned up during an on-line search (yours or IOD's). The cost per item is \$14, which includes 20 pages of photocopying, first-class postage, and royalty payments to the Copyright Clearancehouse.

There will always be room in the electronic universe for the do-it-yourselfer. But as more databases and more information go on-line, the need for professional information gatherers is certain to grow. In the wired nation of the future, it seems quite likely that most of us will do the on-line equivalent of faucet fixing but leave the really heavy work to the pros. ■

COMING UP



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dBASE III Conversions

Beyond its altered syntax and new commands, *dBASE III* has other characteristics that require programmers to take a different approach when applying *dBASE III* to information problems. *Tech Journal* explores those differences—pro and con—with guidelines for making conversions from *dBASE II* to *dBASE III*.

The Right Debugger

Life as a software developer for the PC is not easy. We attempt to clear up the confusion by classifying and judging 15 debugging products.

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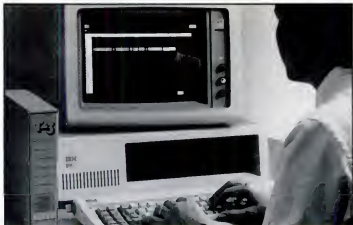
A look at the PC version of a language that has been used for analyzing music, epic poetry, and symbolic computations in mathematical research. It is designed to support sophisticated string manipulation, list processing, and other nonnumeric computation.

Kermit

The *Kermit* file-transfer protocol has been facilitating data sharing on college campuses and is slowly graduating into the business world. Telios, a communications product from Genasys Corporation, incorporated *Kermit* early on. A close look at both *Kermit* and Telios.

The Maverick Controller

A *Tech Journal* hardware review of the Maverick SMD PC-80 hard disk controller, a product that offers users the ability to connect PCs with external hard disks.



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For more information about these two and the rest of our Legendary printers contact Cal-Abco/Legend Peripheral Products, 6041 Variel Avenue, Woodland Hills, Ca 91367. Telephone (818) 704-9100. Outside CA call toll-free 1-800-321-4484. Telex 662436.

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